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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/952,850	11/15/2016	9496930	WBWL001B	5881

112117 7590 10/26/2016

Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

Woodbury Wireless LLC, Pflugerville, TX;
Roc Lastinger, Cave Creek, AZ;
John Spenik, Scottsdale, AZ;
Brian C. Woodbury, Gilbert, AZ;

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

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

Application Number	14952850
Filing Date	2015-11-25
First Named Inventor	Roc Lastinger
Art Unit	2642
Examiner Name	Nghi H LY
Attorney Docket Number	WBWL001B

	42	6118767		2000-09-12	Shen et al.	
	43	6246674		2001-06-12	Feuerstein et al.	
	44	7039441		2006-05-02	Reudink et al.	
	45	6542736		2003-04-01	Parkvall et al.	
	46	6693510		2004-02-17	Yamaguchi	
	47	6047175		2000-04-04	Trompower	
	48	6388999		2002-05-14	Gorsuch et al.	
Change(s) applied to document, /J.F./ 7/6/2016	49	3317912		~~1963-07-81~~ 05-1967	Kelleher	
	50	4825222		1989-04-25	Butcher	
	51	5818385		1998-10-06	Bartholomew	
	52	5969689		1999-10-19	Martek et al.	

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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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)

112117 7590 06/23/2016
Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

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.

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/952,850	11/25/2015	Roc Lastinger	WBWL001B	5881

TITLE OF INVENTION: Methods and Apparatus for Overlapping MIMO Physical Sectors

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	09/23/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
LY, NGHI H	2642	370-338000

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: **Woodbury Wireless, LLC**

(B) RESIDENCE: (CITY and STATE OR COUNTRY): **Pflugerville, Texas**

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 **50-6056** (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 **9/23/2016**

Typed or printed name **Thomas D. Fortenberry** Registration No. **56,537**

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

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Roc Lastinger Application No.: 14/952,850 Filed: 11-25-2015 For: METHODS AND APPARATUS FOR OVERLAPPING MIMO PHYSICAL SECTORS	Confirmation No.: 5881 Examiner: LY, NGHI H Art Unit: 2642 Atty. Docket No.: WBWL001B Date: 9/23/2016

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE UNDER 37 C.F.R. § 1.104(e)

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

Dear Sir:

In response to the Notice of Allowance dated 6/23/2016, please enter the following.

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REMARKS

The Examiner stated the following in the Examiner's Statement of Reasons for Allowance:

The following is an examiner's statement of reasons for allowance:

Regarding claims 21, 36 and 38, Hou et al (US 7,415,288) teaches a system (see fig.5), comprising: the single wireless station including: a first transmission point with a multiple-input-multiple-output (MIMO) capability (see column 3, lines 15-52, "mimo"), the first transmission point having: a plurality of first directional antennas (see column 1, lines 21-41, "directional antenna"), at least one first radio in communication with the first directional antennas (see column 1, lines 21-41, "directional antenna"), and first circuitry in communication with the at least one first radio (see fig.5), a second transmission point with a multiple-input-multiple-output (MIMO) capability (see column 3, lines 15-52, "mimo"), the second transmission point having: a plurality of second directional antennas (see column 1, lines 21-41, "directional antenna"), at least one second radio in communication with the second directional antennas (see column 1, lines 21-41, "directional antenna"), and second circuitry in communication with the at least one second radio (see fig.5), and third circuitry in communication with the first circuitry of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second transmission point with the multiple-input- multiple-output (MIMO) capability (also see column 3, lines 15-52, "mimo" and see fig.5), said single wireless station configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability cooperates with the second transmission point with the multiple-input-multiple-output (MIMO) capability in

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connection with a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device (also see column 3, lines 15-52, "mimo"), and transmitting data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device (also see column 3, lines 15-52, "mimo").

Hou et al (US 7,415,288) fails to teach a single wireless station configured to operate in a packet-switched cellular network, for improving the first transmission, said single wireless station configured for: receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on a measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, altering at least one aspect of the first transmission in connection with at least one of: multiple of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information, and utilizing at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

In response, applicant respectfully points out that features of at least some of the independent claims (e.g. 21, 36 and/or 38) are not necessarily the same as those the Examiner

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has highlighted above. For example, Claim 38 is directed to "a packet-switched cellular network including a plurality of wireless stations including a particular wireless station including: a first group with a multiple-input-multiple-output (MIMO) capability," in the context claimed.

As additional, non-exhaustive examples, Claims 21, 36 and 38 recite the following, respectively:

"21. A system, comprising:

a single wireless station configured to operate in a packet-switched cellular network, the single wireless station including:

a first transmission point with a multiple-input-multiple-output (MIMO) capability, the first transmission point having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second transmission point with a multiple-input-multiple-output (MIMO) capability, the second transmission point having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second transmission point with the multiple-input-multiple-output (MIMO) capability;

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said single wireless station configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability cooperates with the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission;

said single wireless station configured for:

receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on a measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

altering at least one aspect of the first transmission in connection with at least one of: multiple of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability."

"36. A system, comprising:

a single wireless station configured to operate in a packet-switched cellular network, the single wireless station including:

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a first portion with a multiple-input-multiple-output (MIMO) capability, the first portion having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second portion with a multiple-input-multiple-output (MIMO) capability, the second portion having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first portion with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second portion with the multiple-input-multiple-output (MIMO) capability;

said single wireless station configured such that the first portion with the multiple-input-multiple-output (MIMO) capability cooperates with the second portion with the multiple-input-multiple-output (MIMO) capability to support a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission to address interference, by:

in response to at least one first signal sent by the single wireless station, receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on an interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

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in response to at least one second signal sent by the single wireless station, receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

performing beamforming to support the first transmission utilizing at least one of: multiple of the first directional antennas of the first portion with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second portion with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data during the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing the beamforming with at least one of: the multiple first directional antennas of the first portion with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second portion with the multiple-input-multiple-output (MIMO) capability."

"38. A system, comprising:

a packet-switched cellular network including a plurality of wireless stations including a particular wireless station including:

a first group with a multiple-input-multiple-output (MIMO) capability, the first group having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second group with a multiple-input-multiple-output (MIMO) capability, the second group having:

a plurality of second directional antennas,

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at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first group with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second group with the multiple-input-multiple-output (MIMO) capability;

said particular wireless station configured such that the first group with the multiple-input-multiple-output (MIMO) capability cooperates with the second group with the multiple-input-multiple-output (MIMO) capability to support a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission by addressing interference, by:

receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on an interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the second group with the multiple-input-multiple-output (MIMO) capability;

receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

coordinating utilization of at least one of multiple of the first directional antennas of the first group with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second group with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing at least one

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of: the multiple first directional antennas of the first group with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second group with the multiple-input-multiple-output (MIMO) capability."

Clearly, at least some of the independent claims are not necessarily limited to the features that the Examiner has noted in the Examiner's Statement of Reasons for Allowance, as noted above (by way of example only). Instead, each of the claims should only be limited by the language existing therein.

Further, although Applicant agrees with the Examiner's conclusion that these claims are allowable, Applicant notes that the claims may be allowable for reasons other than those identified by the Examiner and does not concede that the Examiner's characterizations of the terms of the claims and the prior art are correct. Each of the claims stands on its own merits and is patentable because of the combination it recites and not because of the presence or absence of any one particular element.

The Examiner's Statement was not prepared by Applicant and only contains the Examiner's possible positions in one or more reasons for allowability. Thus, any interpretation with respect to the Examiner's Statement of Reasons for Allowance should not be imputed to the Applicant.

Respectfully submitted,

Date: September 23, 2016

By: /Thomas D. Fortenberry/ .

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Nokia v. Woodbury Wireless Inc.
Page 000012

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Electronic Patent Application Fee Transmittal

Application Number:	14952850
Filing Date:	25-Nov-2015
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Filer:	THOMAS DONALD FORTENBERRY
Attorney Docket Number:	WBWL001B

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**480**

Electronic Acknowledgement Receipt	
EFS ID:	27022698
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	23-SEP-2016
Filing Date:	25-NOV-2015
Time Stamp:	17:56:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$480
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	20160923_WBWL001B_Part_B_Issue_Fee_Pmt.pdf	192502 0bbdff8a9e0bf3436989ff928976f9e84063b48d	no	1
Warnings:					
Information:					
2	Post Allowance Communication - Incoming	20160923_WBWL001B_Comments_after_NOA_9_23_16.pdf	132530 a4a84cd22b99952181bd963dab2bdad1fdd1ebfd	no	10
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30462 c825d2c0a567bcf64cf3e90ba53c7752002103b0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	355494		

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

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

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

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

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Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

Courtesy Reminder for
Application Serial No: 14/952,850

Attorney Docket No: WBWL001B
Customer Number: 112117
Date of Electronic Notification: 06/23/2016

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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tom@tflawoffices.com
eofficeaction@appcoll.com

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NOTICE OF ALLOWANCE AND FEE(S) DUE

112117 7590 06/23/2016
Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

EXAMINER
LY, NGHI H

ART UNIT	PAPER NUMBER
2642	

DATE MAILED: 06/23/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/952,850	11/25/2015	Roc Lastinger	WBWL001B	5881

TITLE OF INVENTION: Methods and Apparatus for Overlapping MIMO Physical Sectors

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	09/23/2016

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.

Exhibit 1002
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PART B - FEE(S) TRANSMITTAL

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

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

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

112117 7590 06/23/2016
Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/952,850	11/25/2015	Roc Lastinger	WBWL001B	5881

TITLE OF INVENTION: Methods and Apparatus for Overlapping MIMO Physical Sectors

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	09/23/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
LY, NGHI H	2642	370-338000

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

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UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/952,850	11/25/2015	Roc Lastinger	WBWL001B	5881

112117 7590 06/23/2016

Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

EXAMINER	
LY, NGHI H	

ART UNIT	PAPER NUMBER
2642	

DATE MAILED: 06/23/2016

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.

PTOL-85 (Rev. 02/11)

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 14/952,850	Applicant(s) LASTINGER ET AL.	
	Examiner NGHI H. LY	Art Unit 2642	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 *05/03/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *21-40*. 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 _____.

/NGHI H LY/
Primary Examiner, Art Unit 2642

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

REASONS FOR ALLOWANCE

1. Claims 21-40 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claims 21, 36 and 38, Hou et al (US 7,415,288) teaches a system (see fig.5), comprising: the single wireless station including: a first transmission point with a multiple-input-multiple-output (MIMO) capability (see column 3, lines 15-52, "mimo"), the first transmission point having: a plurality of first directional antennas (see column 1, lines 21-41, "directional antenna"), at least one first radio in communication with the first directional antennas (see column 1, lines 21-41, "directional antenna"), and first circuitry in communication with the at least one first radio (see fig.5), a second transmission point with a multiple-input-multiple-output (MIMO) capability (see column 3, lines 15-52, "mimo"), the second transmission point having: a plurality of second directional antennas (see column 1, lines 21-41, "directional antenna"), at least one second radio in communication with the second directional antennas (see column 1, lines 21-41, "directional antenna"), and second circuitry in communication with the at least one second radio (see fig.5), and third circuitry in communication with the first circuitry of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second transmission point with the multiple-input- multiple-output (MIMO) capability (also see column 3, lines 15-52, "mimo" and

see fig.5), said single wireless station configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability cooperates with the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device (also see column 3, lines 15-52, “mimo”), and transmitting data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device (also see column 3, lines 15-52, “mimo”).

Hou et al (US 7,415,288) fails to teach a single wireless station configured to operate in a packet-switched cellular network, for improving the first transmission, said single wireless station configured for: receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on a measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, altering at least one aspect of the first transmission in connection with at least one of: multiple of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information, and utilizing at least one of: the multiple first directional

antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

Dependent claims 22-35, 37, 39 and 40 are allowable for the same reasons.

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

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tzannes (US 2002/0137467A1) teaches fast initialization using seamless rate adaptation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NGHI H. LY whose telephone number is (571)272-7911. The examiner can normally be reached on 9:30am-8:00pm Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rafael Perez-Gutierrez can be reached on (571) 272-7915. 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.

Nghi H. Ly
/NGHI H LY/
Primary Examiner, Art Unit 2642

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/952,850	LASTINGER ET AL.	
	Examiner	Art Unit	
	NGHI H. LY	2642	

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

(1) *NGHI H. LY*. (3)_____.

(2) *Thomas Fortenberry*. (4)_____.

Date of Interview: *14 June 2016*.

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

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

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

Claim(s) discussed: *21,36 and 38*.

Identification of prior art discussed: *Applications 14952867,14952839,14952874,14476628*.

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

Applicants' representative and Examiner discussed the applied arts, the newly found arts, the Double Patenting Rejections, and the submited Terminal Disclaimers in order to place the present application in codition for allowance.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

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

☒ Attachment

/NGHI H LY/ Primary Examiner, Art Unit 2642	

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Page 000028

Summary of Record of Interview Requirements

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

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

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

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

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

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

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

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

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

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

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

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

Examiner to Check for Accuracy

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

Notice of References Cited	Application/Control No. 14/952,850	Applicant(s)/Patent Under Reexamination LASTINGER ET AL.	
	Examiner NGHI H. LY	Art Unit 2642	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7,415,288 B1	08-2008	Hou; Jason	H04B7/0491	370/334
*	B	US-2002/0137467 A1	09-2002	Tzannes, Marcos C.	H04L1/0002	455/69
	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	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S104	3	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multiple adj input adj multiple adj output (MIMO)) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second adj ((directional) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second adj circuitr$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj4 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:10
S105	1	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (plural$4 serveral$3 array) and (antenna transceiv$4 transmit$4 receiv$3) and direction$3 with (antenna transceiv$4 transmit$4 receiv$3) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) with (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and first and second and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:12
S106	2	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and ((multiple adj input adj multiple adj output (MIMO)) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second near3 ((directional) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second near3 circuitr$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second near3 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) andh ((capability able capable) and (multiple adj input adj multiple adj output MIMO))).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:13
S110	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls.	US-PGPUB; USPAT;	OR	ON	2016/06/14 22:20

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		370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (multiple adj input adj multiple adj output (MIMO)) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second adj ((directional) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second adj circuitr$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj4 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO)) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S111	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second adj ((direction$3) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second adj circuit$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj4 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:22
S112	18	((plural$4 serveral$3 array) and (antenna transceiv$4 transmit$4 receiv$3)) and direction$3 with (antenna transceiv$4 transmit$4 receiv$3) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) with (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:23
S114	0	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:24

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		deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))and @ad<"20060228"				
S115	0	((plural$4 serveral$3 array) adj9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((mobile wireless radio terminal apparatus ue ms mt portable handset handheld device) near8 (measur$6 analy$3 diagnos$5) near7 second adj (interference noise quality)) and ((antenna transceiver transmitter receiver) near12 (multiple adj input adj multiple adj output MIMO)) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:25
S116	0	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj (interference noise quality))) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (capability able capable)) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:25
S117	0	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((report$3 send sent transmit$4 deliver$4 pass$3 forward$3 broadcast$3 boardcast$3 receiv$4) near12 second near5 (interference noise quality)) and (multiple adj input adj multiple adj output MIMO) and (direction$4 adj (antenna transceiv$4 transmit$4)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:26
S118	0	((plural$4 serveral$3 array) and (antenna transceiv$4 transmit$4 receiv$3)) and direction$3 with (antenna transceiv$4 transmit$4 receiv$3) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) with (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:26

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		((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))and @ad<"20060228"				
S128	6	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/14 22:39
S129	6	(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:38
S130	0	(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and third and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:38
S131	6	circuitr$4 and radio and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and (data information) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:44
S132	0	circuitr$4 and radio and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9	US-PGPUB; USPAT; USOCR;	OR	ON	2016/06/15 11:45

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		(antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S133	13	(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:46
S134	8	(measur$6 analy$3 diagnos$5) and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:48
S135	20	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:50
S136	32	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:51

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		multiple adj output MIMO) and @ad<"20060228"				
S137	95	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (information data)) and (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:54
S138	21	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:56
S139	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:58
S140	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:59

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		modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"				
S141	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(measur$6 analy$3 diagnos$5) and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 11:59
S142	16	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 12:04
S143	1	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 12:05
S144	21	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4	US-PGPUB; USPAT; USOCR;	OR	ON	2016/06/15 12:06

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		serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (information data)) and (capability able capable) and (multiple adj input adj multiple adj output MIMO)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S145	13	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 12:06
S146	4	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and ((measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 12:07
S147	8	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/06/15 12:08

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S107	3	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multiple adj input adj	US-PGPUB;	OR	ON	2016/06/14 22:10

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		multiple adj output (MIMO)) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second adj ((directional) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second adj circuitr$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj4 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))	USPAT			
S108	1	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (plural$4 serveral$3 array) and (antenna transceiv$4 transmit$4 receiv$3) and direction$3 with (antenna transceiv$4 transmit$4 receiv$3) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) with (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and first and second and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:12
S109	2	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and ((multiple adj input adj multiple adj output (MIMO)) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second near3 ((directional) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second near3 circuitr$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second near3 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) andh ((capability able capable) and (multiple adj input adj multiple adj output MIMO))).clm. and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:13
S119	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (multiple adj input adj multiple adj output (MIMO)) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second adj ((directional) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second adj circuitr$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj4 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO)) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:20
S120	0	(H04W84/12.cpc. HW84/18.cpc.	US-	OR	ON	2016/06/14

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		H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and ((plural$4 serveral$3 array) near9 (antenna transceiv$4 transmit$4 receiv$3)) and (second adj ((direction$3) near9 (antenna transceiv$4 transmit$4 receiv$3))) and (second adj circuit$4) and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj4 (interference noise quality))) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	PGPUB; USPAT			22:22
S121	18	((plural$4 serveral$3 array) and (antenna transceiv$4 transmit$4 receiv$3)) and direction$3 with (antenna transceiv$4 transmit$4 receiv$3) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) with (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:23
S122	6	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:24
S123	0	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:25
S124	0	((plural$4 serveral$3 array) adj9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((mobile wireless radio terminal apparatus ue ms mt portable handset handheld device)	US-PGPUB; USPAT	OR	ON	2016/06/14 22:25

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		near8 (measur$6 analy$3 diagnos$5) near7 second adj (interference noise quality)) and ((antenna transceiver transmitter receiver) near12 (multiple adj input adj multiple adj output MIMO)) and @ad<"20060228"				
S125	0	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (second adj (interference noise quality))) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (capability able capable)) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:25
S126	0	((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((report$3 send sent transmit$4 deliver$4 pass$3 forward$3 broadcast$3 boardcast$3 receiv$4) near12 second near5 (interference noise quality)) and (multiple adj input adj multiple adj output MIMO) and (direction$4 adj (antenna transceiv$4 transmit$4)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:26
S127	0	((plural$4 serveral$3 array) and (antenna transceiv$4 transmit$4 receiv$3)) and direction$3 with (antenna transceiv$4 transmit$4 receiv$3) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) with (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with ((capability able capable) near12 (multiple adj input adj multiple adj output MIMO))and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/14 22:26
S148	6	(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and	US-PGPUB; USPAT	OR	ON	2016/06/15 11:38

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		@ad<"20060228"				
S149	0	(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and third and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:38
S150	6	circuitr$4 and radio and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and (data information) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:44
S151	0	circuitr$4 and radio and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:45
S152	13	(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:46
S153	8	(measur$6 analy$3 diagnos$5) and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:48

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S154	20	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:50
S155	32	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:51
S156	95	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (information data)) and (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:54
S157	21	(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:56
S158	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based	US-PGPUB; USPAT	OR	ON	2016/06/15 11:58

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		accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"				
S159	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:59
S160	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(measur$6 analy$3 diagnos$5) and (alter$3 chang$3 modif$4 updat$4 upgrad$4 adjust$4) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 11:59
S161	16	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and(measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO)	US-PGPUB; USPAT	OR	ON	2016/06/15 12:04
S162	1	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 ((based	US-PGPUB; USPAT	OR	ON	2016/06/15 12:05

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		accord$3 respect$4 correspond$3 basis) adj8 (information data))) and (capability able capable) and (multiple adj input adj multiple adj output MIMO)				
S163	21	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4 switch$3 diversity) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (information data)) and (capability able capable) and (multiple adj input adj multiple adj output MIMO)	US-PGPUB; USPAT	OR	ON	2016/06/15 12:06
S164	13	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO)	US-PGPUB; USPAT	OR	ON	2016/06/15 12:06
S165	8	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (measur$6 analy$3 diagnos$5) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (connection link path channel link resource transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/06/15 12:08

6/16/2016 11:45:13 AM
C:\Users\nly\Documents\EAST\Workspaces\14952850A.wsp

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14952850	LASTINGER ET AL.
	Examiner	Art Unit
	NGHI H LY	2642

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

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

CLAIM		DATE								
Final	Original	03/21/2016	07/06/2016							
1	21	✓	=							
2	22	✓	=							
3	23	✓	=							
4	24	✓	=							
5	25	✓	=							
6	26	✓	=							
7	27	✓	=							
8	28	✓	=							
9	29	✓	=							
10	30	✓	=							
11	31	✓	=							
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13	33	✓	=							
14	34	✓	=							
15	35	✓	=							
16	36	✓	=							
17	37	✓	=							
18	38	✓	=							
19	39	✓	=							
20	40	✓	=							

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14952850	LASTINGER ET AL.
	Examiner	Art Unit
	NGHI H LY	2642

CPC- SEARCHED		
Symbol	Date	Examiner
H04W84/12, HW84/18, H04W80/04	6/15/2016	nly

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
See search history printout.	6/15/2016	nly

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
370	338,328	6/15/2016	nly
455	422.1,424,443,452.2	6/15/2016	nly

SEARCH NOTES		
Search Notes	Date	Examiner
See search history.	6/15/2016	nly

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
370	338,328	6/15/2016	nly
455	422.1,424,443,452.2	6/15/2016	nly

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14952850	LASTINGER ET AL.
	Examiner	**Art Unit**
	NGHI H LY	2642

CPC						
Symbol					**Type**	**Version**
H04B		7	/	0413	F	2013-01-01
H04B		7	/	0495	I	2013-01-01
H04B		7	/	024	I	2013-01-01
H04B		17	/	15	I	2015-01-15
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			/			

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

NONE (Assistant Examiner) (Date)		**Total Claims Allowed:** 20	
/NGHI H LY/ Primary Examiner.Art Unit 2642 (Primary Examiner)	06/15/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 11

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14952850	LASTINGER ET AL.
	Examiner	**Art Unit**
	NGHI H LY	2642

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
370	338	H	0	4	W	4 / 00 (2009.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
370	328				
455	422.1	424	443	452.2	

NONE	Total Claims Allowed:	
(Assistant Examiner) (Date)	20	
/NGHI H LY/ Primary Examiner.Art Unit 2642 06/15/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner) (Date)	1	11

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14952850	LASTINGER ET AL.
	Examiner	**Art Unit**
	NGHI H LY	2642

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

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/NGHI H LY/ Primary Examiner.Art Unit 2642 (Primary Examiner)	06/15/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 11

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Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (08-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Applicant Initiated Interview Request Form

Application No.: 14/952,850 First Named Applicant: Roc Lastinger
Examiner: LY, NGHI H Art Unit: 2642 Status of Application: Pending

Tentative Participants:
(1) Thomas D. Fortenberry **(2)** _____

(3) _____ **(4)** _____

Proposed Date of Interview: May 6, 2016 **Proposed Time:** 11 AM EDT **(AM/PM)**

Type of Interview Requested:
(1) [✓] Telephonic (2) [ ] Personal (3) [ ] Video Conference

Exhibit To Be Shown or Demonstrated: [ ] YES [✓] NO
If yes, provide brief description: _____

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) Dbl Pat. Rej.	21-40	14/952,839 & 14/952,867	[ ]	[ ]	[ ]
(2) _____	_____	14/952,874	[ ]	[ ]	[ ]
(3) _____	_____	_____	[ ]	[ ]	[ ]
(4) _____	_____	_____	[ ]	[ ]	[ ]

[ ] Continuation Sheet Attached [✓] Proposed Amendment or Arguments Attached
Brief Description of Arguments to be Presented: Terminal Disclaimers filed to overcome Rejections.

An interview was conducted on the above-identified application on _____

NOTE: This form should be completed and filed by applicant in advance of the interview (see MPEP § 713.01). If this form is signed by a registered practitioner not of record, the Office will accept this as an indication that he or she is authorized to conduct an interview on behalf of the principal (37 CFR 1.32(a)(3)) pursuant to 37 CFR 1.34. This is not a power of attorney to any above named practitioner. See the Instruction Sheet for this form, which is incorporated by reference. By signing this form, applicant or practitioner is certifying that he or she has read the Instruction Sheet. After the interview is conducted, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible. This application will not be delayed from issue because of applicant's failure to submit a written record of this interview.

/Thomas D. Fortenberry/
Applicant/Applicant's Representative Signature

_____
Examiner/SPE Signature

Thomas D. Fortenberry
Typed/Printed Name of Applicant or Representative

56,537
Registration Number, if applicable

This collection of information is required by 37 CFR 1.133. 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 24 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.

PTOL-413A (08-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Instruction Sheet for:
APPLICANT INITIATED INTERVIEW REQUEST FORM

(Not to be Submitted to the USPTO)

1. If this form is signed by a registered practitioner not of record, the authority to submit the Applicant Initiated Interview Request Form is pursuant to limited authority to act in a representative capacity under 37 CFR 1.34 and further proof of authority to act in a representative capacity may be required. *See* 37 CFR 1.34.

   The Office will accept the signed form as an indication that the registered practitioner not of record is authorized to conduct an interview on behalf of the principal in pursuant to 37 CFR 1.34.

   For more information, see the "Conducting an Interview with a Registered Practitioner Acting in a Representative Capacity" notice which is available on the USPTO Web site at: http://www.uspto.gov/patents/law/notices/2010.jsp.

2. This is not a power of attorney to any named practitioner. Accordingly, any registered practitioner not of record named on the form does not have authority to sign a request to change the correspondence address, a request for express abandonment, a disclaimer, a power of attorney, or other document requiring the signature of the applicant, assignee of the entire interest or an attorney of record. If appropriate, a separate power of attorney to the named practitioner should be executed and filed in the US Patent and Trademark Office.

3. Any interview concerning an unpublished application under 35 U.S.C. § 122(b) with a registered practitioner not of record, pursuant to 37 CFR 1.34, will be conducted based on the information and files supplied by the practitioner in view of the confidentiality requirements of 35 U.S.C. § 122(a).

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000052

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.

Electronic Patent Application Fee Transmittal

Application Number:	14952850
Filing Date:	25-Nov-2015
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Filer:	THOMAS DONALD FORTENBERRY
Attorney Docket Number:	WBWL001B

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	2251	1	100	100
Miscellaneous:				
		Total in USD ($)		**100**

Electronic Acknowledgement Receipt	
EFS ID:	25676718
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	03-MAY-2016
Filing Date:	25-NOV-2015
Time Stamp:	21:13:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$100
RAM confirmation Number	6431
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reply under 1.111 to Pre-Interview Communication	20160503_WBWL001B_FirstActionInterviewPilotProgramCommunication.pdf	28813 c863f327dbdd29909d16cbc11a8c9d8fd8348cf8	no	2
Warnings:					
Information:					
2	First Action Interview - Schedule Interview request	20160503_WBWL001B_App_Initiated_Interview_Request_PTOL413A.pdf	420738 0379daff26191d3e903f03b9c845ae62a3386dee	no	3
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30550 9c6885c263d7d73e1293ffe5b93eb5b3866b9e4a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	480101		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 5881
Roc Lastinger	Examiner: Nghi H LY
Application No.: 14/952,850	Art Unit: 2642
File Date: 2015-11-25	Docket No.: WBWL001B
Title: Methods and Apparatus for Overlapping MIMO Physical Sectors	Date: May 3, 2016

AMENDMENT(S)/ARGUMENT(S) IN RESPONSE TO FIRST ACTION INTERVIEW PILOT PROGRAM PRE-INTERVIEW COMMUNICATION

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

Examiner:

Following are amendment(s)/argument(s) in response to the First Action Interview Pilot Program Pre-Interview Communication mailed 03/24/2016.

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000058

Remarks:

The Examiner has rejected the claims under a double patenting rejection. Such rejection is deemed avoided by virtue of the terminal disclaimers filed herewith.

It is believed that all of the pending issues have been addressed. However, the absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Still yet, nothing in this reply should be construed as intention to concede any issue with regard to any claim, except as specifically stated in this reply. Finally, it should be noted that no claims are intended to be construed under 35 U.S.C. 112, paragraph 6.

Applicant does not believe that any fees are due other than those fees related to a one (1) month extension of time, which Applicant submits herewith. However, in the event that any other fees are due, the Director is hereby authorized to charge any required fees due (other than issue fees), and to credit any overpayment made, in connection with the filing of this paper to Deposit Account No. 50-6056 (Order No. WBWL001B).

Should the Examiner deem that any further amendment is desirable to place this application in condition for allowance, applicant invites the Examiner to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

Date: May 3, 2016

By: /Thomas D. Fortenberry/ .

THOMAS D. FORTENBERRY
Reg. No. 56,537
P.O. Box 2099
Woodville, Texas 75979
Tel. (409) 283-2811
Fax (409) 291-7042
ATTORNEY FOR APPLICANT

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000059

Doc Code: DIST.E.FILE **Document Description: Electronic Terminal Disclaimer - Filed**	PTO/SB/25 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION**
Application Number	14952850
Filing Date	25-Nov-2015
First Named Inventor	Roc Lastinger
Attorney Docket Number	WBWL001B
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent Interest
Woodbury Wireless LLC	100%

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s)

14952874 filed on 11/25/2015

14476628 filed on 09/03/2014

14952867 filed on 11/25/2015

14952839 filed on 11/25/2015

as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that any such patent granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

(●) Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request. ( ) I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.	
Applicant claims the following fee status: (●) Small Entity ( ) Micro Entity ( ) Regular Undiscounted 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 Section 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 issued thereon.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: (●) An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application Registration Number 56537 ( ) A sole inventor ( ) A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ( ) A joint inventor; all of whom are signing this request	
Signature	/Thomas D. Fortenberry/
Name	Thomas D. Fortenberry

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	14952850
Filing Date:	25-Nov-2015
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Filer:	THOMAS DONALD FORTENBERRY
Attorney Docket Number:	WBWL001B

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Statutory or Terminal Disclaimer	2814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**160**

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 14952850

Filing Date: 25-Nov-2015

Applicant/Patent under Reexamination: Lastinger et al.

Electronic Terminal Disclaimer filed on May 3, 2016

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	25674643
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	03-MAY-2016
Filing Date:	25-NOV-2015
Time Stamp:	21:21:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$160
RAM confirmation Number	6448
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Electronic Terminal Disclaimer-Filed	eTerminal-Disclaimer.pdf	36053 4c77fd4cbd5b00df380b3632adc866014fba2373	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30424 d59f760a93dd0d6dcc71fbd635bcfb654e0a8edf	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	66477		

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

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/952,850	11/25/2015	Roc Lastinger	WBWL001B	5881

112117 7590 03/24/2016

Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

EXAMINER
LY, NGHI H

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
03/24/2016	ELECTRONIC

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

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

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

tom@tflawoffices.com
eofficeaction@appcoll.com

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000067

Notice of References Cited	Application/Control No. 14/952,850	Applicant(s)/Patent Under Reexamination LASTINGER ET AL.	
	Examiner NGHI H. LY	Art Unit 2642	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2016/0080047 A1	03-2016	Lastinger; Roc	H04B7/024	375/267
*	B	US-2016/0080049 A1	03-2016	Lastinger; Roc	H04B7/0413	375/267
*	C	US-2016/0080050 A1	03-2016	Lastinger; Roc	H04B7/0413	375/267
	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	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

First Action Interview Pilot Program Pre-Interview Communication	Application No. 14/952,850	Applicant(s) LASTINGER ET AL.	
	Examiner NGHI H. LY	Art Unit 2642	AIA (First Inventor to File) Status No

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

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

This time period for reply is extendable under 37 CFR 1.136(a) for only ONE additional MONTH.

This communication constitutes notice under 37 CFR 1.136(a)(1)(i).

Applicant must, within the time period for reply, file: (1) A letter requesting not to have a first action interview; (2) A reply under 37 CFR 1.111 waiving the first action interview and First Action Interview Office Action; or (3) An Applicant Initiated Interview Request Form (PTOL-413A) electronically via EFS-Web, accompanied by a proposed amendment or arguments, and schedule the interview within 2 months from the filing of the request. A failure to respond to this communication will be treated as a request not to have an interview. If applicant waives the First Action Interview Office Action, the instant Pre-Interview Communication is deemed the first Office Action on the Merits. The next subsequent Office action may be made final if appropriate. See MPEP 706.07(a).

Status

1)☒ Responsive to communication(s) filed on *02/17/2015*.

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

Disposition of Claims

2)☒ Claim(s) *21-40* is/are pending in the application.

2a) Of the above claim(s) _____ is/are withdrawn from consideration.

3)☐ Claim(s) _____ is/are allowed.

4)☒ Claim(s) *21-40* is/are rejected.

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

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

Application Papers

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

8)☒ The drawing(s) filed on *11/25/2015* 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

9)☐ 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.

Contact Information

Examiner's Telephone Number: (571)272-7911

Examiner's Typical Work Schedule: 9:30am-8:00pm Monday-Thursday

Supervisor's Name: Rafael Perez-Gutierrez

Supervisor's Telephone Number: (571) 272-7915

Attachment(s)	
1) ☒Notice of References Cited (PTO-892)	3) ☐Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
2) ☒Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.	4) ☐ Other: _____.

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000069

First Action Interview Pilot Program Pre-Interview Communication	**Application No.** 14/952,850	**Applicant(s)** LASTINGER ET AL.	
	Examiner NGHI H. LY	**Art Unit** 2642	**AIA (First Inventor to File) Status** No

Notification of Rejection(s) and/or Objection(s)

#	Claim(s)	Reference(s) (if applicable)	Rejection Statutory Basis	Brief Explanation of Rejection
1	21-40	A,B,C	Double Patenting Rejection.	Claims 21-40 of Application 14/952,839 in view of claims 21-40 of Application 14/952,867 and further in view of claims 21-49 of Application 14/952,874.

Expanded Discussion/Commentary

1		Reference A: 14/952,839 (Pub. US 2016/0080047); Reference B: 14/952,867 (Pub. US 2016/0080049); Reference C: 14/952,874 (Pub. US 2016/0080050).

DATE: 21 March, 2016	/NGHI H LY/ Primary Examiner, Art Unit 2642	

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000070

Notice of References Cited	Application/Control No. 14/952,850	Applicant(s)/Patent Under Reexamination LASTINGER ET AL.	
	Examiner NGHI H. LY	Art Unit 2642	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2016/0080047 A1	03-2016	Lastinger; Roc	H04B7/024	375/267
*	B	US-2016/0080049 A1	03-2016	Lastinger; Roc	H04B7/0413	375/267
*	C	US-2016/0080050 A1	03-2016	Lastinger; Roc	H04B7/0413	375/267
	D	US-				
	E	US-				
	F	US-				
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14952850	LASTINGER ET AL.
	Examiner	Art Unit
	NGHI H LY	2642

CPC- SEARCHED		
Symbol	Date	Examiner
H04W84/12, HW84/18, H04W80/04	3/21/2016	nly

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
See search history printout.	3/21/2016	nly

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
370	338,328	3/21/2016	nly
455	422.1,424,443,452.2	3/21/2016	nly

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
370	338,328	3/21/2016	nly
455	422.1,424,443,452.2	3/21/2016	nly

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	14952850
	Filing Date	2015-11-25
	First Named Inventor	Roc Lastinger
	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

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	1	20030131124	A1	2003-07-10	Yi et al.	
	2	20030125040	A1	2003-07-03	Walton et al.	
	3	20030072255	A1	2003-04-17	Ma et al.	
	4	20030043887	A1	2003-03-06	Hudson	
	5	20020193146	A1	2002-12-19	Wallace et al.	

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	Art Unit	2642
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	Attorney Docket Number	WBWL001B

	6	20030013451	A1	2003-01-16	Walton	
	7	20020168945	A1	2002-11-14	Hwang et al.	
	8	20020173302	A1	2002-11-21	Baker et al.	
	9	20020154705	A1	2002-10-24	Walton et al.	
	10	20020119799	A1	2002-08-29	Moulsley et al.	
	11	20020094834	A1	2002-07-18	Baker et al.	
	12	20020067309	A1	2002-06-06	Baker et al.	
	13	20020062472	A1	2002-05-23	Medlock et al.	
	14	20020039884	A1	2002-04-04	Raynes et al.	
	15	20010033622	A1	2001-10-25	Jongren et al.	

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	1	200235289	KR		2001-10-10	HIGHGAIN ANTENNA CO.,LTD.	1	

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	1	Blum et al., "On the Capacity of Cellular Systems with MIMO," proc. 2001 Fall IEEE Vehicuar Technology Conf., vol 2, pp 1220-1224, Atlantic City, NJ, Oct. 2001.	
	2	Xiaodong et al., "Handover Mechanism in Coordinated Multi-Point Transmission/Reception System," ZTE Corporate, ZTE Communications, 2010, no. 1	
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	7	Spencer et al., "Capacity and downlink transmission algorithms for a multi-user MIMO Channel," Conference record of the Thirty-Second Asilomar Conference on Signals, systems, and Computers, vol 2, pp. 1384-1388, Nov. 2002.	

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	8	Wyner, "Shannon-theoretic approach to a Gaussian Cellular Multiple-access channel," IEEE Trans, on Inform. Theory, vol 40, no. 6, pp. 1713-1727, nov. 1994	
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	16	Molisch, "MIMO systems with antenna selection-an overview," Proc. Radio and Wireless Conference, 2003, RAWCON 03, pp. 167-170 Aug 2003	
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	Art Unit	2642
	Examiner Name	Nghi H LY
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	19	U.S. Patent Application No. 14/952,874 filed 2015-11-25	

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Page 000077

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	First Named Inventor	Roc Lastinger
	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

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☒ A certification statement is not submitted herewith.

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

Signature	/Thomas D. Fortenberry/	Date (YYYY-MM-DD)	2016-02-15
Name/Print	Thomas D. Fortenberry	Registration Number	56537

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SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/952,850	11/25/2015 RULE	370	2642	WBWL001B

APPLICANTS
Woodbury Wireless LLC, Pflugerville, TX;

INVENTORS
Roc Lastinger, Cave Creek, AZ;
John Spenik, Scottsdale, AZ;
Brian C. Woodbury, Gilbert, AZ;

**** CONTINUING DATA **************************
This application is a CON of 14/476,628 09/03/2014
which is a CON of 13/348,523 01/11/2012 PAT 8855089
which is a CON of 13/118,386 05/28/2011 PAT 8345651
which is a CON of 11/709,431 02/21/2007 PAT 8009646
which claims benefit of 60/743,376 02/28/2006

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

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Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /NGHI H LY/ Examiner's Signature	☐ Met after Allowance nly Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		AZ	8	20	3

ADDRESS
Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979
UNITED STATES

TITLE
Methods and Apparatus for Overlapping MIMO Physical Sectors

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	1	7430257	B1	2008-09-30	Shattil	Entire Document
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	1	Sharmai and Zaidel, "Enchaning the Cellular Downlink Capacity via Co-Processing at the Transmitting End," IEEE, 06/2001, pages 1745-1749	
	2	U.S. Application No. 10/145,854, filed May 14, 2002.	
	3	U.S. Provisional Application No. 60/286,850, filed April 26, 2001	
	4	U.S. Provisional Application No. 60/598,187, filed August 2, 2004	

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Name/Print	Thomas D. Fortenberry	Registration Number	56537

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

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

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

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

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

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

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Examiner Name	Nghi H LY
Attorney Docket Number	WBWL001B

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	2	7359675		2008-04-15	Lastinger et al.	
	3	7308270		2007-12-11	Lastinger et al.	
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	123	4736453		1988-04-05	Schloemer	
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First Named Inventor	Roc Lastinger
Art Unit	2642
Examiner Name	Nghi H LY
Attorney Docket Number	WBWL001B

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	3	2785488	FR	A1	2000-05-05	Engineering Et De Representati		
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
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Examiner Signature	/Nghi Ly/	Date Considered	03/21/2016

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

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

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

Signature	/Thomas D. Fortenberry/	Date (YYYY-MM-DD)	2016-02-15
Name/Print	Thomas D. Fortenberry	Registration Number	56537

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(Not for submission under 37 CFR 1.99)

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Filing Date	2015-11-25
First Named Inventor	Roc Lastinger
Art Unit	2642
Examiner Name	Nghi H LY
Attorney Docket Number	WBWL001B

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	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	68	20110149997	A1	2011-06-23	Yi et al.	
	69	20110149870	A1	2011-06-23	Yi et al.	
	70	20110149869	A1	2011-06-23	Yi et al.	
	71	20110096751	A1	2011-04-28	Ma et al.	
	72	20110069742	A1	2011-03-24	Narayan et al.	
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	75	20110019656	A1	2011-01-27	McCloud et al.	
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	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	79	20100142479	A1	2010-06-10	Black et al.	
	80	20100142638	A1	2010-06-10	Jalali et al.	
	81	20100098014	A1	2010-04-22	Larsson	
	82	20100061496	A1	2010-03-11	Black et al.	
	83	20100061243	A1	2010-03-11	YI et al.	
	84	20100034148	A1	2010-02-11	Zhang et al.	
	85	20100040034	A1	2010-02-18	Shah	
	86	20100020815	A1	2010-01-28	YI et al.	
	87	20090305711	A1	2009-12-10	Rinne et al.	
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	90	20090327546	A1	2009-12-31	Guri et al.	
	91	20090274232	A1	2009-11-05	Sutivong et al.	
	92	20090252200	A1	2009-10-08	Dohler et al.	
	93	20090180411	A1	2009-07-16	YI et al.	
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	Art Unit	2642
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	101	20080279125	A1	2008-11-13	Hottinen	
	102	20080268848	A1	2008-10-30	TOMOE et al.	
	103	20080253375	A1	2008-10-16	Yi et al.	
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	109	20080039107	A1	2008-02-14	Ma et al.	
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	112	20070213062	A1	2007-09-13	Medlock et al.	
	113	20070249340	A1	2007-10-25	Hiltunen et al.	
	114	20070160012	A1	2007-07-12	Liu	
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	123	20070072550	A1	2007-03-29	Wang	
	124	20070066362	A1	2007-03-22	Ma et al.	
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	128	20060291371	A1	2006-12-28	Sutivong et al.	
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	134	20060245509	A1	2006-11-02	Khan et al.	
	135	20060215592	A1	2006-09-28	Tomoe et al.	
	136	20060193268	A1	2006-08-31	Walton et al.	
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	145	20060088007	A1	2006-04-27	Jalali et al.	
	146	20060077935	A1	2006-04-13	Hamalainen et al.	
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	151	20050277422	A1	2005-12-15	Baker et al.	
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	156	20050047485	A1	2005-03-03	Khayrallah et al.	
	157	20050078742	A1	2005-04-14	Cairns et al.	
	158	20050018789	A1	2005-01-27	Jia et al.	
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	162	20040224691	A1	2004-11-11	Hadad	
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	Art Unit	2642
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.L./

	167	20040131025	A1	2004-07-08	Dohler et al.	
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	169	20040057530	A1	2004-03-25	Tarokh et al.	
	170	20040066866	A1	2004-04-08	Tong et al.	
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	1	Notice of Allowance from U.S. Application No. 12/020,932, dated May 16, 2008	
	2	Notice of Allowance from U.S. Application No. 12/021,278, dated September 11, 2009	
	3	Notice of Allowance from U.S. Application No. 12/134,122, dated October 22, 2010	
	4	Non-Final Office Action from U.S. Application No. 12/134,122, dated May 24, 2010	
	5	Notice of Allowance from U.S. Application No. 12/134,959, dated August 10, 2010	
	6	Non-Final Office Action from U.S. Application No. 12/134,959, dated February 24, 2010	
	7	Notice of Allowance from U.S. Application No. 13/118,386, dated November 9, 2012	
	8	Non-Final Office Action from U.S. Application No. 13/118,386, dated May 3, 2012	
	9	Notice of Allowance from U.S. Application No. 13/192,181, dated September 25, 2012	

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	10	Non-Final Office Action from U.S. Application No. 13/192,181, dated June 1, 2012	
	11	Non-Final Office Action from U.S. Application No. 13/192,181, dated February 22, 2012	
	12	Notice of Allowance from U.S. Application No. 13/211,529, dated December 9, 2011	
	13	Notice of Allowance from U.S. Application No. 13/218,185, dated June 12, 2012	
	14	Non-Final Office Action from U.S. Application No. 13/218,185, dated March 28, 2012	
	15	Notice of Allowance from U.S. Application No. 13/348,523, dated June 26, 2014	
	16	Non-Final Office Action from U.S. Application No. 13/348,523, dated January 2, 2014	
	17	Notice of Allowance from U.S. Application No. 13/566,986, dated March 4, 2013	
	18	Non-Final Office Action from U.S. Application No. 13/566,986, dated November 1, 2012	

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CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Thomas D. Fortenberry/	Date (YYYY-MM-DD)	2016-02-15
Name/Print	Thomas D. Fortenberry	Registration Number	56537

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	NGHI H LY	2642

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

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

CLAIM		DATE								
Final	Original	03/21/2016								
	21	✓								
	22	✓								
	23	✓								
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	40	✓								

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S105	6	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and ((measur$7 analy$4 diagnos$6) near5 (interference noise quality)).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:21
S106	3	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near22 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:27
S107	0	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:27
S108	66	(multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:30
S109	15	(direction$4 near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:31
S110	11	(directional near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:31
S111	17	(directional near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2016/03/21 06:32

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		input adj multiple adj output MIMO) and @ad<"20060228"	IBM_TDB			
S112	8	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:33
S113	0	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data)) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:55
S114	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:56
S115	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:56
S116	2	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (direction$4 near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:57
S117	5	(directional near5 (antenna$3 transceive$4	US-PGPUB;	OR	ON	2016/03/21

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		transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			06:58
S118	2	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((report$3 send sent transmit$4 deliver$4 pass$3 forward$3 broadcast$3 boardcast$3 receiv$4) near12 second near5 (interference noise quality)) and (multiple adj input adj multiple adj output MIMO) and (direction$4 adj (antenna transceiv$4 transmit$4)) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:59
S119	5	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 06:59
S120	0	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 07:12

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		radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"				
S121	5	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (capability able capable)) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 07:13
S122	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 07:14
S123	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 07:14

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		transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((report$3 send sent transmit$4 deliver$4 pass$3 forward$3 broadcast$3 boardcast$3 receiv$4) near12 second near5 (interference noise quality)) and (multiple adj input adj multiple adj output MIMO) and (direction$4 adj (antenna transceiv$4 transmit$4)) and @ad<"20060228"				
S124	1	14/952839	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 07:34
S145	8	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and ((multipl$4 dupl$4) near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/03/21 12:30

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S125	6	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and ((measur$7 analy$4 diagnos$6) near5 (interference noise quality)).clm.	US-PGPUB; USPAT	OR	ON	2016/03/21 06:21
S126	0	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (infomation data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:25
S127	0	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (infomation data))) and (multiple adj input adj multiple adj output MIMO).clm.	US-PGPUB; USPAT	OR	ON	2016/03/21 06:25
S128	0	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near22 ((based accord$4 basis correspond$4 respect$4) adj6 (infomation data))) and (multiple adj input adj multiple adj output MIMO).clm.	US-PGPUB; USPAT	OR	ON	2016/03/21 06:26
S129	3	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near22	US-PGPUB; USPAT	OR	ON	2016/03/21 06:27

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		((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm.				
S130	0	(Roc near3 Lastinger John near3 Spenik Brian near3 Woodbury) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:27
S131	66	(multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:30
S132	17	(directional near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:32
S133	8	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:33
S134	0	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data)) with (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:55
S135	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:56
S136	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output	US-PGPUB; USPAT	OR	ON	2016/03/21 06:56

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		MIMO).clm. and @ad<"20060228"				
S137	2	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (direction$4 near5 (antenna$3 transceive$4 transmit$4)) and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO).clm. and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:57
S138	5	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:58
S139	2	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((report$3 send sent transmit$4 deliver$4 pass$3 forward$3 broadcast$3 boardcast$3 receiv$4) near12 second near5 (interference noise quality)) and (multiple adj input adj multiple adj output MIMO) and (direction$4 adj (antenna transceiv$4 transmit$4)) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:59
S140	5	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 06:59

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S141	0	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((alter$3 chang$4 modif$4 updat$4 upgrad$4) near12 (transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 07:12
S142	5	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3) near12 (capability able capable)) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 07:13
S143	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((transmission transmit$3 send$3 deliver$4 boardcast$3 broadcast$3)) with (capability able capable) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 07:14
S144	0	(H04W84/12.cpc. HW84/18.cpc. H04W80/04.cpc. 370/338.ccls. 370/338.ccls. 370/328.ccls. 455/422.1.ccls. 455/424.ccls. 455/443.ccls. 455/452.2.ccls.) and (directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and (multipl$4 near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information	US-PGPUB; USPAT	OR	ON	2016/03/21 07:14

		data))) and ((plural$4 serveral$3 array) near9 (antenna transceiver transmitter receiver)) and ((directional) near9 (antenna transceiver transmitter receiver)) and circuit$4 and radio and ((measur$6 analy$3 diagnos$5) near7 (interference noise quality)) and ((report$3 send sent transmit$4 deliver$4 pass$3 forward$3 broadcast$3 boardcast$3 receiv$4) near12 second near5 (interference noise quality)) and (multiple adj input adj multiple adj output MIMO) and (direction$4 adj (antenna transceiv$4 transmit$4)) and @ad<"20060228"				
S146	8	(directional near5 (antenna$3 transceive$4 transmit$4)) and circuit$5 and radio and ((multipl$4 dupl$4) near5 (antenna$3 transceive$4 transmit$4) near7 ((based accord$4 basis correspond$4 respect$4) adj6 (information data))) and (multiple adj input adj multiple adj output MIMO) and @ad<"20060228"	US-PGPUB; USPAT	OR	ON	2016/03/21 12:32

3/21/2016 12:40:24 PM
C:\Users\nly\Documents\EAST\Workspaces\14952850.wsp

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/952,850	11/25/2015	Roc Lastinger	WBWL001B

CONFIRMATION NO. 5881

112117
Thomas D. Fortenberry, Attorney at Law
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Woodville, TX 75979

PUBLICATION NOTICE

OC000000081482041

Title: Methods and Apparatus for Overlapping MIMO Physical Sectors

Publication No.US-2016-0080048-A1
Publication Date:03/17/2016

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MAILED
FEB 16 2016
OFFICE OF PETITIONS

Doc Code: TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 14/952,850

1. THE REQUEST FILED November 25, 2015 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination

A. ☒ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;
B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
C. filing a **request for continued examination**;
D. filing a notice of appeal;
E. filing a request for suspension of action;
F. mailing of a notice of allowance;
G. mailing of a final Office action;
H. completion of examination as defined in 37 CFR 41.102; or
I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to Irvin Dingle at (571)272-3210, Office of Petitions.

Irvin Dingle
/Irvin Dingle/
[*Signature*]

Lead Paralegal Specialist
(Title)

PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14952850
Filing Date	2015-11-25
First Named Inventor	Roc Lastinger
Art Unit	2642
Examiner Name	Nghi H LY
Attorney Docket Number	WBWL001B

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7302278		2007-11-27	Lastinger et al.	
	2	7359675		2008-04-15	Lastinger et al.	
	3	7308270		2007-12-11	Lastinger et al.	
	4	7274944		2007-09-25	Lastinger et al.	
	5	7305246		2007-12-04	Lastinger et al.	
	6	7349701		2008-03-25	Lastinger et al.	
	7	7348930		2008-03-25	Lastinger et al.	
	8	7489282		2009-02-10	Lastinger et al.	

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	9	7400860		2008-07-15	Lastinger et al.	
	10	7595756		2009-09-29	Lastinger et al.	
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	12	8009646		2011-08-30	Lastinger et al.	
	13	7424298		2008-09-09	Lastinger et al.	
	14	7616959		2009-11-10	Spenik et al.	
	15	7873319		2011-01-18	Lastinger et al.	
	16	7822386		2010-10-26	Lastinger et al.	
	17	8345651		2013-01-01	Lastinger et al.	
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	20	8270383		2012-09-18	Lastinger et al.	
	21	8855089		2014-10-07	Lastinger et al.	
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	23	4144496		1979-03-13	Cunningham et al.	
	24	5771449		1998-06-23	Blasing et al.	
	25	6104935		2000-08-15	Smith et al.	
	26	6229486		2001-05-08	Krile	
	27	6272337		2001-08-07	Mount et al.	
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	31	6405058		2002-06-11	Bobier	
	32	6421542		2002-07-16	Sandler et al.	
	33	6463301		2002-10-08	Bevan et al.	
	34	6470195		2002-10-22	Meyer	
	35	6486832		2002-11-26	Abramov et al.	
	36	6505045		2003-01-07	Hills et al.	
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	38	6560443		2003-05-06	Vaisanen et al.	
	39	6690657		2004-02-10	Lau et al.	
	40	5113525		1992-05-12	Andoh	
	41	5161249		1992-11-03	Meche et al.	

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	42	6118767		2000-09-12	Shen et al.	
	43	6246674		2001-06-12	Feuerstein et al.	
	44	7039441		2006-05-02	Reudink et al.	
	45	6542736		2003-04-01	Parkvall et al.	
	46	6693510		2004-02-17	Yamaguchi	
	47	6047175		2000-04-04	Trompower	
	48	6388999		2002-05-14	Gorsuch et al.	
	49	3317912		1963-07-01	Kelleher	
	50	4825222		1989-04-25	Butcher	
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	52	5969689		1999-10-19	Martek et al.	

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	53	6070090		2000-05-30	Feuerstein	
	54	2272312		1942-02-01	Tunick	
	55	3681770		1972-08-01	Alford	
	56	4101901		1978-07-18	Kommrusch	
	57	6069591		2000-05-30	Smith	
	58	6914577		2005-07-05	McCandless	
	59	3803625		1974-04-09	Nemit	
	60	4128740		1978-12-05	Graziano	
	61	5265263		1993-11-23	Ramsdale et al.	
	62	5276907		1994-01-04	Meidan	
	63	5307507		1994-04-26	Kanai	

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	64	5365571		1994-11-15	Rha et al.	
	65	5491833		1996-02-13	Hamabe	
	66	5548813		1996-08-20	Charas et al.	
	67	5603082		1997-02-11	Hamabe	
	68	5606727		1997-02-25	Ueda	
	69	5613200		1997-03-18	Hamabe	
	70	5649292		1997-07-15	Doner	
	71	5684491		1997-11-04	Newman et al.	
	72	5740536		1998-04-14	Benveniste	
	73	5835859		1998-11-10	Doner	
	74	5901356		1999-05-04	Hudson	

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	75	5960349		1999-09-28	Chheda et al.	
	76	6055230		2000-04-25	Feuerstein et al.	
	77	6128497		2000-10-03	Faruque	
	78	6154654		2000-11-28	Mao	
	79	6178328		2001-01-23	Tang et al.	
	80	6360107		2002-03-19	Lin et al.	
	81	6400697		2002-06-04	Leung et al.	
	82	6400704		2002-06-04	Mikuni et al.	
	83	6405043		2002-06-11	Jensen et al.	
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	86	6487414		2002-11-26	Tanay et al.	
	87	6497599		2002-12-24	Johnson et al.	
	88	6522885		2003-02-18	Tang et al.	
	89	6542485		2003-04-01	Mujtaba	
	90	6615047		2003-09-02	Yasooka et al.	
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	92	6708036		2004-03-16	Proctor et al.	
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	94	6748218		2004-06-08	Johnson et al.	
	95	6795409		2004-09-21	Youssefmir et al.	
	96	6898431		2005-05-24	Peele	

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	97	7010015		2006-03-07	Hervey, Jr. et al.	
	98	7069009		2006-06-27	Li et al.	
	99	7194017		2007-03-20	Hervey, Jr. et al.	
	100	7202824		2007-04-10	Sanelli et al.	
	101	7280829		2007-10-09	Rudolf	
	102	5212930		1993-05-25	Raudat	
	103	6549169		2003-04-15	Matsuyoshi et al.	
	104	7181258		2007-02-20	Lin et al.	
	105	7373176		2008-05-13	Chotkowski et al.	
	106	6266527		2001-07-24	Mintz	
	107	6738599		2004-05-18	Black et al.	

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	108	6930991		2005-08-16	Ozluturk	
	109	4475010		1984-10-02	Huensch et al.	
	110	6774864		2004-08-10	Evans et al.	
	111	7193562		2007-03-20	Shtrom et al.	
	112	7292198		2007-11-06	Shtrom et al.	
	113	7358912		2008-04-15	Kish et al.	
	114	7362280		2008-04-22	Shtrom et al.	
	115	7498996		2009-03-03	Shtrom et al.	
	116	7522552		2009-04-21	Fein et al.	
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	118	7675474		2010-03-09	Shtrom et al.	

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	119	6095820		2000-08-01	Luxon et al.	
	120	6249256		2001-06-19	Luxon et al.	
	121	6906674		2005-06-14	McKinzie, III et al.	
	122	7171248		2007-01-30	Brown	
	123	4736453		1988-04-05	Schloemer	
	124	4829554		1989-05-09	Barnes et al.	
	125	5134709		1992-07-28	Bi et al.	
	126	5396649		1995-03-07	Hamabe	
	127	5404574		1995-04-04	Benveniste	
	128	5448761		1995-09-05	Ushirokawa	
	129	5475864		1995-12-12	Hamabe	

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	130	5491837		1996-02-13	Haartsen	
	131	5507008		1996-04-09	Kanai et al.	
	132	5574977		1996-11-12	Joseph et al.	
	133	5590399		1996-12-31	Matsumoto et al.	
	134	5697059		1997-12-09	Carney	
	135	5722043		1998-02-24	Rappaport et al.	
	136	5726978		1998-03-10	Frodigh et al.	
	137	5732353		1998-03-24	Haartsen	
	138	5771454		1998-06-23	Ohsawa	
	139	5787352		1998-07-28	Benveniste	
	140	5790551		1998-08-04	Chan	

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	141	5809423		1998-09-15	Benveniste	
	142	5828948		1998-10-27	Almgren et al.	
	143	5887263		1999-03-23	Ishii	
	144	5896573		1999-04-20	Yang et al.	
	145	5926763		1999-07-20	Greene, Sr. et al.	
	146	5956643		1999-09-21	Benveniste	
	147	5963865		1999-10-05	Desgagne et al.	
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	151	6023459		2000-02-08	Clark et al.	

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	152	6047187		2000-04-04	Haartsen	
	153	6047189		2000-04-04	Yun et al.	
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	155	6108321		2000-08-22	Anderson et al.	
	156	6112092		2000-08-29	Benveniste	
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	163	6219541		2001-04-17	Brodie	
	164	6219554		2001-04-17	Eswara et al.	
	165	6230016		2001-05-08	Benveniste	
	166	6243584		2001-06-05	O'Byrne	
	167	6259685		2001-07-10	Rinne et al.	
	168	6272348		2001-08-07	Saario et al.	
	169	6295453		2001-09-25	Desgagne et al.	
	170	6317598		2001-11-13	Wiesen et al.	
	171	6330429		2001-12-11	He	
	172	6334057		2001-12-25	Malmgren et al.	
	173	6351643		2002-02-26	Haartsen	

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	174	6438386		2002-08-20	Joshi et al.	
	175	6459901		2002-10-01	Chawla et al.	
	176	6470183		2002-10-22	Herrig	
	177	6496490		2002-12-17	Andrews et al.	
	178	6507568		2003-01-14	Kumar et al.	
	179	6519240		2003-02-11	Dillinger et al.	
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	181	6580912		2003-06-17	Leung et al.	
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	183	6597920		2003-07-22	Yegani et al.	
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	185	6606499		2003-08-12	Verrier et al.	
	186	6650655		2003-11-18	Alvesalo et al.	
	187	6697626		2004-02-24	Eidson et al.	
	188	6728544		2004-04-27	Boyer et al.	
	189	6744743		2004-06-01	Walton et al.	
	190	6871073		2005-03-22	Boyer et al.	
	191	6889047		2005-05-03	Ishida	
	192	6940845		2005-09-06	Benveniste	
	193	6999772		2006-02-14	Song et al.	
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	196	7085572		2006-08-01	Ishida	
	197	7085579		2006-08-01	Mizutani et al.	
	198	7130636		2006-10-31	Kitazawa et al.	
	199	7133380		2006-11-07	Winters et al.	
	200	7136654		2006-11-14	Hogberg et al.	
	201	7145880		2006-12-05	Saxena et al.	
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	203	7180877		2007-02-20	Benveniste	
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	205	7187933		2007-03-06	Song et al.	
	206	7200405		2007-04-03	Rudolf et al.	

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	207	7212822		2007-05-01	Vicharelli et al.	
	208	7257376		2007-08-14	Reudink	
	209	7315533		2008-01-01	Theobold et al.	
	210	7336956		2008-02-26	Halonen et al.	
	211	7366178		2008-04-29	Lee et al.	
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	214	7415288		2008-08-19	Hou et al.	
	215	7498999		2009-03-03	Shtrom	
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	218	7639106		2009-12-29	Shtrom	
	219	7652632		2010-01-26	Shtrom	
	220	7880683		2011-02-01	Shtrom et al.	
	221	7893882		2011-02-22	Shtrom	
	222	7899497		2011-03-01	Kish et al.	
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	230	8289902		2012-10-16	Fein et al.	
	231	8248993		2012-08-21	Cai	
	232	8139658		2012-03-20	Tsatsanis et al.	
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	234	7796544		2010-09-14	Hench	
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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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See attached certification statement.

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

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	First Named Inventor	Roc Lastinger
	Art Unit	2642
	Examiner Name	Nghi H LY
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	5	Notice of Allowance from U.S. Application No. 12/134,959, dated August 10, 2010	
	6	Non-Final Office Action from U.S. Application No. 12/134,959, dated February 24, 2010	
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	8	Non-Final Office Action from U.S. Application No. 13/118,386, dated May 3, 2012	
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	2	20030125040	A1	2003-07-03	Walton et al.	
	3	20030072255	A1	2003-04-17	Ma et al.	
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	1	200235289	KR		2001-10-10	HIGHGAIN ANTENNA CO.,LTD.	1	

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	2	Xiaodong et al., "Handover Mechanism in Coordinated Multi-Point Transmission/Reception System," ZTE Corporate, ZTE Communications, 2010, no. 1	
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SIGNATURE

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

Signature	/Thomas D. Fortenberry/	Date (YYYY-MM-DD)	2016-02-15
Name/Print	Thomas D. Fortenberry	Registration Number	56537

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

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

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

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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.

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

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000247

Electronic Acknowledgement Receipt

EFS ID:	24913985
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	15-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	16:06:33
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)	WBWL001B_IDS_1of3_2016-02.pdf	1044479 d0375f6136368fdc05eada3d5bb67fe068ca33a8	no	39

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2	Information Disclosure Statement (IDS) Form (SB08)	WBWL001B_IDS_2of3_2016-02.pdf	1042007 a4adbb2bee5cd5ff5a78810e3792b5216744c470	no	33
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6	Non Patent Literature	10869201_FOA_04-17-2006.pdf	1138223 57a2b37b9761fe0932bb43c9c9b0230f78770f4d	no	30
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7	Non Patent Literature	10869201_FOA_05-20-2005.pdf	1016841 7cf72ae53f61f3efcbf2fa8bfdeba93b2204519e	no	27
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8	Non Patent Literature	10869201_NOA_09-27-2007.pdf	312563 b3f0ae0ed542e19a3880b4115343f8d0346c422e	no	6
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11	Non Patent Literature	10869201_OA_11-04-2005.pdf	817561 5af6a630fde2de32d746ba277afc304e78b00df5	no	22
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12	Non Patent Literature	10869201_RR_01-13-2005.pdf	190505 a4b1235448b654da7f11ad9eb757571bfc46ddba	no	6
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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

Electronic Acknowledgement Receipt

EFS ID:	24914036
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	15-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	16:11:39
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	Non Patent Literature	11160550_AA_09-21-2006.pdf	165047 86f7f5df4fecef84e99c82be26a24fcc98361307	no	4
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3	Non Patent Literature	11160550_NOA_07-24-2007.pdf	406766 1c1ce255124357d5bdb2c995f8985c94bc8f6b3e	no	8
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6	Non Patent Literature	11160551_FOA_02-09-2007.pdf	729882 be9c5d566f5395515741f891b713703f76eb5abc	no	18
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20	Non Patent Literature	11586178_FOA_11-21-2008.pdf	457550 ae634524d07ff573f4373b0639238ba4a4831672	no	13

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	24914096
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	15-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	16:16:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

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2	Non Patent Literature	11586178_OA_04-15-2009.pdf	286621 7aea2461d37e12dcbf64d1b60266356b8ade3b8c	no	8
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3	Non Patent Literature	11586178_OA_06-09-2008.pdf	387892 cabffee000202e36faf5dce34b4e58002da9ff95	no	11
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5	Non Patent Literature	11709431_NOA_07-23-2010.pdf	296263 c8397cf1393ec39352b7b489e8cb6f137fefae13	no	6
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14	Non Patent Literature	13118386_NOA_11-09-2012.pdf	476242 e117a59b37b40f6f59ba8bf0875d77dbb93ba369	no	10
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15	Non Patent Literature	13118386_OA_05-03-2012.pdf	527848 56397d50346c172d0e80c5af5ebd129a489b7c7b	no	17
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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.

Electronic Acknowledgement Receipt

EFS ID:	24914157
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	15-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	16:22:36
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.)
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2	Non Patent Literature	13348523_NOA_06-26-2014.pdf	398994 224ad57554d7d0afcc0dff0a19252d1f806528ed4	no	7
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Information:					
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6	Non Patent Literature	Baier_Joint_Transmission_an_alternative.pdf	1006209 1931d6eb4cfe5dc31593997b623bc3dbfb9deef4	no	5
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Information:					
7	Non Patent Literature	Blum_On_the_Capacity_of_Cellular_Systems.pdf	1018696 94729a4cd9837bf5cfe70e7a4703b7a02ef8be61	no	5
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17	Non Patent Literature	EP622925A1.pdf	810926 402b4decc3ff6fad9d971212a6a1813d2e3dcec7	no	13
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18	Non Patent Literature	EP635989A1.pdf	1176087 1ebe9c9a1bb36a5592b0afa6bef5bbb1eb48d8db	no	18
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19	Non Patent Literature	EP660631A2.pdf	1056306 fe3d75b983e5831cc06dc49a3f54e15cfac4a588	no	15
Warnings:					
Information:					

20	Non Patent Literature	EP668627A1.pdf	561186 7dc67280ece9f2e201d2c9daaffdcd4a2571aad0	no	9
Warnings:					
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			Total Files Size (in bytes):	16295859	

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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
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Electronic Acknowledgement Receipt

EFS ID:	24914209
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	15-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	16:27:54
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	Non Patent Literature	EP715478A2.pdf	871021 80dc2a4776da4449b85f65648d9345f34f41657b	no	16
Warnings:					
Information:					

2	Non Patent Literature	EP734194A1.pdf	481958 9a3bc6aab6112c0bee276f144dc9cfce207a5681	no	18
Warnings:					
Information:					
3	Non Patent Literature	EP782361A2.pdf	1299077 5d869ceccd25c32d47851df959fcbedc385819f2	no	24
Warnings:					
Information:					
4	Non Patent Literature	EP785695A2.pdf	1148115 78a856d0377cec0c21289ca15268cf25dac303a0	no	23
Warnings:					
Information:					
5	Non Patent Literature	EP802695A2.pdf	1056499 2f022722d7955a3349a349bfd3c1f556151b7f61	no	23
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6	Non Patent Literature	EP867096A1.pdf	308348 e6c4b2957a906fc32456830bc0c39a39e1d04767	no	15
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7	Non Patent Literature	EP895436A2.pdf	1167466 2ac6efab7d044a3fee0c755efe54cec2bc5e9bf0	no	24
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Information:					
8	Non Patent Literature	EP925706A1.pdf	368635 934990facf79dec066137ae4e6928b49a6724584	no	22
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9	Non Patent Literature	EP980111A1.pdf	351131 4c98dbe4db3a7eb2dded268e8ce865e9b45e6a6a	no	10
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10	Non Patent Literature	EP983705A2.pdf	296808 037c3975445bf9e0641bb0156216ffcda4d5d3d4	no	15
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Information:					

11	Non Patent Literature	EP1013013A1.pdf	344155 70e98f9dc5492cf887a3c671aea20c9d2492 3871	no	19
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Information:					
13	Non Patent Literature	EP1106028A1.pdf	468910 45775227589fff091f106156970be88d8777 b81d	no	32
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14	Non Patent Literature	EP1148749A2.pdf	1500803 1b8a74d6d2b31bfc34b7a9417dc10b05cfaf fd44	no	30
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15	Non Patent Literature	EP1189467A1.pdf	1341724 7427460871c0d4780da6ad636eeae5d8833 4116e	no	21
Warnings:					
Information:					
16	Non Patent Literature	EP1594261A2.pdf	513926 41def78a52e926973f0d52b4930b8b7d0ed 423cd	no	10
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17	Non Patent Literature	FR2785488A1.pdf	779743 a0624097c700281c8a0334554481e914b47 fb022	no	32
Warnings:					
Information:					
18	Non Patent Literature	Goldsmith_Capacity_Limits_of_MIMO_Channels.pdf	1056492 898acf90c43cf2eeb2dd4757745989a0d65f 3a85	no	19
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19	Non Patent Literature	Jafar_PhantomNet_Exploring_Optimal.pdf	220726 84d973d22091a71a0f431cde9b6796aa97e 257b2	no	5
Warnings:					
Information:					

20	Non Patent Literature	Jafar_Transmitter_Optimization_for_Multiple.pdf	249532 3f3039f2b995facac1aab6d87282b694b6d7d1ba	no	1

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Total Files Size (in bytes):	14205097

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Electronic Acknowledgement Receipt

EFS ID:	24914300
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	15-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	16:37:29
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	Non Patent Literature	WO9952311A1.pdf	1622424 c3b281ed19136d180632d59319a9c5142f0296c7	no	36
Warnings:					
Information:					

2	Non Patent Literature	WO2005010652A2.pdf	4870178 90e69a61b0eff1c64a4640ffcd9f6442f7c357f4	no	98
Warnings:					
Information:					
3	Non Patent Literature	WO2005039225A1.pdf	905723 8a6d16ccbab4c217f251d25c10d66476880 5f246	no	20
Warnings:					
Information:					
4	Non Patent Literature	Wyner_Shannon-theoretic_approach_to.pdf	2796328 6f6de39216a2d1c3d8d3d187b0b6c4f38d1 43f6a	no	15
Warnings:					
Information:					
5	Non Patent Literature	Xiaodong_Handover_Mechanism_in_coordinated.pdf	276184 8f18ea179ed4d4375e03faac24df7c1df20a bca1	no	8
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Information:					
6	Non Patent Literature	Zhang_BaseStation_2004.pdf	359508 f9845fb16d58e49817e218ab89ccb8375d0 41146	no	6
Warnings:					
Information:					
		Total Files Size (in bytes):	10830345		

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<u>New Applications Under 35 U.S.C. 111</u>
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<u>National Stage of an International Application under 35 U.S.C. 371</u>
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<u>New International Application Filed with the USPTO as a Receiving Office</u>
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14952850
	Filing Date	2015-11-25
	First Named Inventor	Roc Lastinger
	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7430257	B1	2008-09-30	Shattil	Entire Document
	2	8670390	B2	2014-03-11	Shattil	Entire Document
	3	9136931	B2	2015-09-15	Shattil	Entire Document
	4	9225471	B2	2015-12-29	Shattil	Entire Document

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080095121	A1	2008-04-24	Shattil	Entire Document
	2	20150270882	A1	2015-09-24	Shattil	Entire Document

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14952850
	Filing Date	2015-11-25
	First Named Inventor	Roc Lastinger
	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Sharmai and Zaidel, "Enchaning the Cellular Downlink Capacity via Co-Processing at the Transmitting End," IEEE, 06/2001, pages 1745-1749	
	2	U.S. Application No. 10/145,854, filed May 14, 2002.	
	3	U.S. Provisional Application No. 60/286,850, filed April 26, 2001	
	4	U.S. Provisional Application No. 60/598,187, filed August 2, 2004	

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14952850
	Filing Date	2015-11-25
	First Named Inventor	Roc Lastinger
	Art Unit	2642
	Examiner Name	Nghi H LY
	Attorney Docket Number	WBWL001B

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Thomas D. Fortenberry/	Date (YYYY-MM-DD)	2016-02-14
Name/Print	Thomas D. Fortenberry	Registration Number	56537

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

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

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

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

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

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

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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.

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000273

Electronic Acknowledgement Receipt

EFS ID:	24910526
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	14-FEB-2016
Filing Date:	25-NOV-2015
Time Stamp:	19:55:57
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)	20160214_WBWL001B_IDS.pdf	612224 c50f1f7c4c54cfaee6d45fa3ec7809eccd6ef22c	no	4

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Warnings:					
Information:					
4	Non Patent Literature	20160214_IDS_NPL3_60286850.pdf	1827814 8e62876712d6cb12975dad04fedb26dd64b8e2af	no	38
Warnings:					
Information:					
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Warnings:					
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		Total Files Size (in bytes):	11335764		

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Roc Lastinger Application No.: 14/952,850 Filed: 11-25-2015 For: METHODS AND APPARATUS FOR OVERLAPPING MIMO PHYSICAL SECTORS	Confirmation No.: 5881 Examiner: Art Unit: 2414 Atty. Docket No.: WBWL001B Date: 12/17/2015

PRELIMINARY AMENDMENT A
AND
RESPONSE TO INFORMAL NOTICE TO APPLICANT

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

Examiner:

Prior to substantive examination, please enter the following amendments in the above application. Further, in response to the Informal Notice to Applicant dated 12/10/2015, applicant includes a Substitute Statement in Lieu of an Oath or Declaration for John Spenik.

AMENDMENTS TO THE CLAIMS

Amended claims follow:

1-20. (Cancelled)

21. (New) A system, comprising:

a single wireless station configured to operate in a packet-switched cellular network, the single wireless station including:

a first transmission point with a multiple-input-multiple-output (MIMO) capability, the first transmission point having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second transmission point with a multiple-input-multiple-output (MIMO) capability, the second transmission point having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second transmission point with the multiple-input-multiple-output (MIMO) capability;

said single wireless station configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability cooperates with the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission;

said single wireless station configured for:

receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on a measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

altering at least one aspect of the first transmission in connection with at least one of: multiple of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

22. (New) The system of Claim 21, wherein the system is configured such that the first directional antennas and the second directional antennas include multiple-input-multiple-output (MIMO) antennas.

23. (New) The system of Claim 21, wherein the system is configured such that the first information is identified by enabling at least one of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, and measuring an ability of the at least one first directional antenna of the first transmission point with the multiple-input-multiple-output (MIMO) capability to communicate with the first multiple-input-multiple-output (MIMO)-capable portable wireless device.

24. (New) The system of Claim 21, wherein the system is configured such that at least one of the first information or the second information is a function of at least one of: a data throughput, a signal-to-noise ratio, a reduced signal error, a reduced data error, a reduced retransmission request, a reduced interference, a rejection of multipath signal, a higher transmission rate, or a signal strength, in connection with the first multiple-input-multiple-output (MIMO)-capable portable wireless device.

25. (New) The system of Claim 21, wherein the system is configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second transmission point with the multiple-input-multiple-output (MIMO) capability are capable of communicating with the first multiple-input-multiple-output (MIMO)-capable portable wireless device utilizing the same channel with at least one different channel characteristic.

26. (New) The system of Claim 25, wherein the system is configured such that the at least one different channel characteristic includes at least one of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related, in connection with the same channel.

27. (New) The system of Claim 25, wherein the system is configured such that the at least one different channel characteristic includes at least two of: a channel characteristic related to a throughput-related aspect, a channel characteristic related to a signal-to-noise

ratio-related aspect, a channel characteristic related to a signal strength-related aspect, and a channel characteristic related to a multipath signal-related aspect, in connection with the same channel.

28. (New) The system of Claim 25, wherein the system is configured such that the at least one different channel characteristic includes at least three of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, and a channel characteristic that is multipath signal-related, in connection with the same channel.

29. (New) The system of Claim 25, wherein the system is configured such that the at least one different channel characteristic includes at least four of: a channel characteristic related to a throughput-related aspect, a channel characteristic related to a signal-to-noise ratio-related aspect, a channel characteristic related to a signal strength-related aspect, and a channel characteristic related to a multipath signal-related aspect, in connection with the same channel.

30. (New) The system of Claim 21, wherein the system is configured such that the altering the at least one aspect includes selecting both the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the same data is transmitted in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device via a same channel, utilizing both the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

31. (New) The system of Claim 21, wherein the system is configured such that the altering the at least one aspect includes selecting only one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the data is transmitted in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing only the selected one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

32. (New) The system of Claim 21, wherein the system is configured such that coordination is performed for selectively directing a beam associated with the first transmission to improve the transmission of the data by overcoming interference.

33. (New) The system of Claim 21, wherein the system is configured such that the altering the at least one aspect includes altering beamforming in connection with at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the data is transmitted in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing the beamforming in connection with the at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

34. (New) The system of Claim 33, wherein the system is configured such that the beamforming involves weighting and the altering is performed to improve the first transmission independent of a handoff.

35. (New) The system of Claim 21, wherein at least one of:

said first directional antennas are multiple-input-multiple-output (MIMO) antennas;

said second directional antennas are multiple-input-multiple-output (MIMO) antennas;

said first directional antennas and the second directional antennas reduce the effects of noise on transmission and reception;

said first directional antennas exhibit temporal diversity;

said second directional antennas exhibit temporal diversity;

said first transmission point includes a first portion and the second transmission point includes a second portion;

said first transmission point includes a first part and the second transmission point includes a second part;

said first transmission point includes a first group and the second transmission point includes a second group;

said at least one first radio is in communication with the first directional antennas via at least one switch;

said at least one first radio is in communication with the first directional antennas via at least one phased array;

said at least one first radio includes a single radio that is in communication with the plurality of first directional antennas;

said at least one second radio is in communication with the second directional antennas via at least one switch;

said at least one second radio is in communication with the second directional antennas via at least one phased array;

said at least one second radio includes a single radio that is in communication with the plurality of second directional antennas;

said first circuitry includes at least one controller;

said second circuitry includes at least one controller;

said third circuitry includes at least one processor;

said single wireless station includes a single wireless cell;

said single wireless station includes at least one wireless cell;

said altering is performed by the third circuitry;

said altering includes selecting both the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability;

said altering the at least one aspect includes altering the at least one aspect in connection with only the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability;

said transmitting the data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device includes transmitting the data utilizing the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability;

said first directional antennas and the second directional antennas have associated therewith a multiple-input-multiple-output (MIMO) virtual sector including an area where a multiple-input-multiple-output (MIMO) physical sector is to operate;

said first directional antennas and the second directional antennas form multiple-input-multiple-output (MIMO) virtual sectors that are capable of being selected to provide multiple-input-multiple-output (MIMO) physical sectors;

said first directional antennas and the second directional antennas are positioned in fixed positions to form multiple-input-multiple-output (MIMO) virtual sectors that are capable of being selected to communicate using one or more multiple-input-multiple-output (MIMO) physical sectors associated with the multiple-input-multiple-output (MIMO) virtual sectors;

said multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability include all of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO)

capability, the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability include all of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability; or

said first multiple-input-multiple-output (MIMO)-capable portable wireless device includes at least one of a mobile device, a client, a computer, or a hand-held device.

36. (New) A system, comprising:

a single wireless station configured to operate in a packet-switched cellular network, the single wireless station including:

a first portion with a multiple-input-multiple-output (MIMO) capability, the first portion having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second portion with a multiple-input-multiple-output (MIMO) capability, the second portion having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first portion with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second portion with the multiple-input-multiple-output (MIMO) capability;

said single wireless station configured such that the first portion with the multiple-input-multiple-output (MIMO) capability cooperates with the second portion with the multiple-input-multiple-output (MIMO) capability to support a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission to address interference, by:

in response to at least one first signal sent by the single wireless station, receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on an interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

in response to at least one second signal sent by the single wireless station, receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

performing beamforming to support the first transmission utilizing at least one of: multiple of the first directional antennas of the first portion with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second portion with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data during the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing the beamforming with at least one of: the multiple first directional antennas of the first portion with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second portion with the multiple-input-multiple-output (MIMO) capability.

37. (New) The system of Claim 36, wherein the system is configured such that a channel between the first portion and the first multiple-input-multiple-output (MIMO)-capable portable wireless device differs from another channel between the second portion

and the first multiple-input-multiple-output (MIMO)-capable portable wireless device in terms of at least one channel characteristic that includes at least one of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related.

38. (New) A system, comprising:

a packet-switched cellular network including a plurality of wireless stations including a particular wireless station including:

a first group with a multiple-input-multiple-output (MIMO) capability, the first group having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second group with a multiple-input-multiple-output (MIMO) capability, the second group having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first group with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second group with the multiple-input-multiple-output (MIMO) capability;

said particular wireless station configured such that the first group with the multiple-input-multiple-output (MIMO) capability cooperates with the second group with the multiple-input-multiple-output (MIMO) capability to support a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission by addressing interference, by:

receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on an interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the second group with the multiple-input-multiple-output (MIMO) capability;

receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

coordinating utilization of at least one of multiple of the first directional antennas of the first group with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second group with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing at least one

of: the multiple first directional antennas of the first group with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second group with the multiple-input-multiple-output (MIMO) capability.

39. (New) The system of Claim 38, wherein the system is configured such that a channel between the first group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device differs from another channel between the second group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device in terms of at least one channel characteristic that includes at least one of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related.

40. (New) The system of Claim 38, wherein the system is configured such that a channel between the first group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device differs from another channel between the second group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device in terms of at least two channel characteristics that include at least two of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related.

REMARKS

The claims have been amended to clarify what is being claimed. No new matter has been added.

Should the Examiner deem that any further amendment is desirable to place this application in condition for allowance, applicant invites the Examiner to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

Date: December 17, 2015

By: /Thomas D. Fortenberry/ .

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Doc code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	METHODS AND APPARATUS FOR OVERLAPPING MIMO PHYSICAL SECTORS

This statement is directed to:

☐ The attached application,

OR

☒ United States application or PCT international application number 14/952,850 filed on 11-25-2015

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

John Spenik

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country

Mailing Address (except for a deceased or legally incapacitated inventor):

City	State	Zip	Country

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

- ☐ Legal Representative (for deceased or legally incapacitated inventor only),
- ☒ Assignee,
- ☐ Person to whom the inventor is under an obligation to assign,
- ☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or
- ☐ Joint Inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- [x] Inventor is deceased,
- [ ] Inventor is under legal incapacity,
- [ ] Inventor cannot be found or reached after diligent effort, or
- [ ] Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- [x] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- [ ] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

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Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Brian C. Woodbury | Date (Optional):

Signature: 

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Woodbury Wireless, LLC

Title of Person Executing This Substitute Statement: Managing Member

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City Pflugerville | State TX | Country US

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

1003 Rocky Creek Drive

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Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

Electronic Acknowledgement Receipt

EFS ID:	24402295
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	17-DEC-2015
Filing Date:	25-NOV-2015
Time Stamp:	18:35:54
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	Preliminary Amendment	20151217_WBWL001B_Preliminary_Amendment_12_17_2015.pdf	51218 ea1fa54524c42dfe727898636eb25f3bdf3f5648	no	14

Warnings:	
Information:	

2	Oath or Declaration filed	20151217_WBWL001B_Subt_Stmt_in_Lieu_of_Oath_Spenik.pdf	677014 3f88075937e2858f883e9989a46af3cef7df1478	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

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/952,850	Filing Date 11/25/2015	☒ 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	12/17/2015	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 3	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
/ANGELA JOHNSON/

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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
14/952,850	11/25/2015	2414	800	WBWL001B	20	3

CONFIRMATION NO. 5881

FILING RECEIPT

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Woodville, TX 75979

OC000000079268719

Date Mailed: 12/10/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

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Applicant(s)

Woodbury Wireless LLC, Pflugerville, TX;

Assignment For Published Patent Application

Woodbury Wireless LLC, Pflugerville, TX

Power of Attorney: The patent practitioners associated with Customer Number 112117

Domestic Priority data as claimed by applicant

This application is a CON of 14/476,628 09/03/2014
which is a CON of 13/348,523 01/11/2012 PAT 8855089
which is a CON of 13/118,386 05/28/2011 PAT 8345651
which is a CON of 11/709,431 02/21/2007 PAT 8009646
which claims benefit of 60/743,376 02/28/2006

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

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Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/09/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/952,850**

Projected Publication Date: 03/17/2016

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

Methods and Apparatus for Overlapping MIMO Physical Sectors

Preliminary Class

370

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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

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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 (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

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technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/952,850

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	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	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	730		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.

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
14/952,850	11/25/2015	Roc Lastinger	WBWL001B

CONFIRMATION NO. 5881

112117
Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

OC00000079268723

Date Mailed: 12/10/2015

NOTICE OF ACCEPTANCE OF AUTHORIZATION TO PERMIT ACCESS TO APPLICATION VIA PRIORITY DOCUMENT EXCHANGE

This is in response to the applicant's authorization to permit access to the application-as-filed by participating offices under 37 CFR 1.14(h)(1) submitted on 11/25/2015.

The authorization to permit access to the application under 37 CFR 1.14(h)(1) is accepted.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/hhagos/

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/952,850	11/25/2015	Roc Lastinger	WBWL001B

CONFIRMATION NO. 5881

112117
Thomas D. Fortenberry, Attorney at Law
P.O. Box 2099
Woodville, TX 75979

INFORMAL NOTICE

OC00000079268720

Date Mailed: 12/10/2015

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  John Spenik
- The substitute statement is signed by a person who is not identified as the applicant under 37 CFR 1.46 in an application data sheet (ADS). Only an applicant under 37 CFR 1.43, 1.45 or 1.46 may execute a substitute statement. See 37 CFR 1.64(a). An application data sheet in compliance with 37 CFR 1.76 identifying the person (i.e., assignee, obligated assignee, or person who otherwise shows sufficient proprietary interest) executing the substitute statement as the applicant, or an inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to the inventor for whom the substitute statement was provided, is required.
  John Spenik

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/hhagos/

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Doc Code: FAI.REQ
Document Description: Request First Action Interview

PTO/SB/413C (05-11)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR FIRST ACTION INTERVIEW (FULL PILOT PROGRAM)

Attorney Docket Number: WBWL001B	Application Number (if known):	Filing date: 2015-11-25
First Named Inventor: Roc Lastinger	Title: Methods and Apparatus for Overlapping MIMO Physical Sectors	

APPLICANT HEREBY REQUESTS A FIRST ACTION INTERVIEW IN THE ABOVE-IDENTIFIED APPLICATION. See Instruction Sheet on page 2.

1. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims.

2. The application must not contain any multiple dependent claims.

3. By filing this request:

   Applicant is agreeing to make an election without traverse if the Office determines that the claims are not obviously directed to a single invention; and

   Applicant is agreeing not to request for a refund of the search fee and any excess claims fee paid in the application after the mailing or notification of the pre-interview communication prepared by the examiner.

4. Other attachments: _____

Signature /Thomas D. Fortenberry/	Date 2015-11-25
Name (Print/Typed) Thomas D. Fortenberry	Registration Number 56,537

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

■ *Total of 1 forms are submitted.

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 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, 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.

PTO/SB/413C (05-11)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Instruction Sheet for Request for First Action Interview (Full Pilot Program)

(Not to be Submitted to the USPTO)

A grantable request must meet the following conditions:

1. The application must be a new non-reissue utility application filed under 35 U.S.C. 111(a) or an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).

2. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims. The application may not contain any multiple dependent claims.

3. The request must be filed electronically using the Office's electronic filing system, EFS-Web.

4. The claims must be directed to a single invention. If the Office determines that the claims are directed to multiple inventions (*e.g.*, in a restriction requirement), the applicant must make an election without traverse.

5. The request must be filed at least one day before a first Office action on the merits of the application appears in the Patent Application Information Retrieval (PAIR) system (*i.e.*, at least one day prior to the date when a first Office action on the merits, notice of allowability or allowance, or action under Ex parte Quayle, 1935 Dec. Comm'r Pat. 11 (1935) appears in the PAIR system). Applicant may check the status of the application using the PAIR system.

6. The request for a first action interview must include a statement that applicant agrees not to file a request for a refund of the search fee and any excess claims fees paid in the application after the mailing or notification of the Pre-Interview Communication. Any petition for express abandonment under 37 CFR 1.138(d), and request for a refund of the search fee and any excess claims fees, filed after the mailing or notification of the Pre-Interview Communication will not be granted.

For more information, see notice "Full First Action Interview Pilot Program" available on the USPTO web site at http://www.uspto.gov/patents/init_events/faipp_full.jsp

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Privacy Act Statement

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

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

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

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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Filer:	THOMAS DONALD FORTENBERRY
Attorney Docket Number:	WBWL001B

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Request for Prioritized Examination	2817	1	2000	2000
Pages:				
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2800**

Electronic Acknowledgement Receipt	
EFS ID:	24199931
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	25-NOV-2015
Filing Date:	
Time Stamp:	20:38:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2800
RAM confirmation Number	28262
Deposit Account	506056
Authorized User	FORTENBERRY, THOMAS D
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 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WBWL001B_ADS.pdf	1561750 b39ba27b206455ac6bfab15b0ce469f5bc1b7734	no	8
Warnings:					
Information:					
2	Drawings-only black and white line drawings	WBWL001B_Drawings.pdf	167887 89c9f3f43930bf5d0ca6b3e32c1493401cf17925	no	8
Warnings:					
Information:					
3		WBWL001B_spec.pdf	132730 df16f899848d43d30e9de3fa9767abcbf32b0cb9	yes	30

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	19
Claims	20	29
Abstract	30	30

Warnings:					
Information:					
4	Oath or Declaration filed	WBWL001B_Oaths.pdf	406627 2b8845585d9daec31c0233f2210b097af27457b6	no	4
Warnings:					
Information:					
5	Power of Attorney	WBWL001B_POA.pdf	88460 32123a40272cb517426e437ad3b0192216fde24e	no	1
Warnings:					
Information:					
6	Power of Attorney	WBWL001B_373C.pdf	455163 e1cb5d790bbafc767e71190106b3fcf2aaea496e	no	9

Warnings:					
Information:					
7	TrackOne Request	WBWL001B_Interview_Pilot_Program.pdf	621920 841274e7c720b6a396dea4c4e97e8de28f9cf811	no	3
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	40732 2dfacabd682cb323e0cb654fee9ccdfcf76da970	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	3475269		

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

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

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

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

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Roc		Lastinger	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Cave Creek	State/Province	AZ	Country of Residence i	US

Mailing Address of Inventor:

Address 1	14362 N. Frank Lloyd Wright Blvd., Suite 2500		
Address 2			
City	Scottsdale	State/Province	AZ
Postal Code	85260	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	John		Spenik	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Scottsdale	State/Province	AZ	Country of Residence i	US

Mailing Address of Inventor:

Address 1	14362 N. Frank Lloyd Wright Blvd., Suite 2500		
Address 2			
City	Scottsdale	State/Province	AZ
Postal Code	85260	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Brian	C.	Woodbury	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

City	Gilbert	**State/Province**	AZ	**Country of Residence** i	US

Mailing Address of Inventor:

Address 1	1343 S. Nielson Street		
Address 2			
City	Gilbert	**State/Province**	AZ
Postal Code	85296	**Country** i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	112117		
Email Address	tom@tflawoffices.com	Add Email	Remove Email

Application Information:

Title of the Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors		
Attorney Docket Number	WBWL001B	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		**Suggested Figure for Publication (if any)**	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country i

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	(●) Customer Number	( ) US Patent Practitioner	( ) Limited Recognition (37 CFR 11.9)
Customer Number	112117		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	14476628	2014-09-03

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14476628	Continuation of	13348523	2012-01-11	8855089	2014-10-07

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13348523	Continuation of	13118386	2011-05-28	8345651	2013-01-01

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13118386	Continuation of	11709431	2007-02-21	8009646	2011-08-30

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11709431	Claims benefit of provisional	60743376	2006-02-28

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	Woodbury Wireless LLC		
Mailing Address Information:			
Address 1	1003 Rocky Creek Drive		
Address 2			
City	Pflugerville	**State/Province**	TX
Country [i]	US	Postal Code	78660
Phone Number		Fax Number	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

Email Address	

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	Woodbury Wireless LLC

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	1003 Rocky Creek Drive		
Address 2			
City	Pflugerville	**State/Province**	TX
Country i	US	Postal Code	78660
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

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

Signature	/Thomas D. Fortenberry/			Date (YYYY-MM-DD)	2015-11-25
First Name	Thomas	Last Name	Fortenberry	Registration Number	56537

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	WBWL001B
	Application Number	
Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

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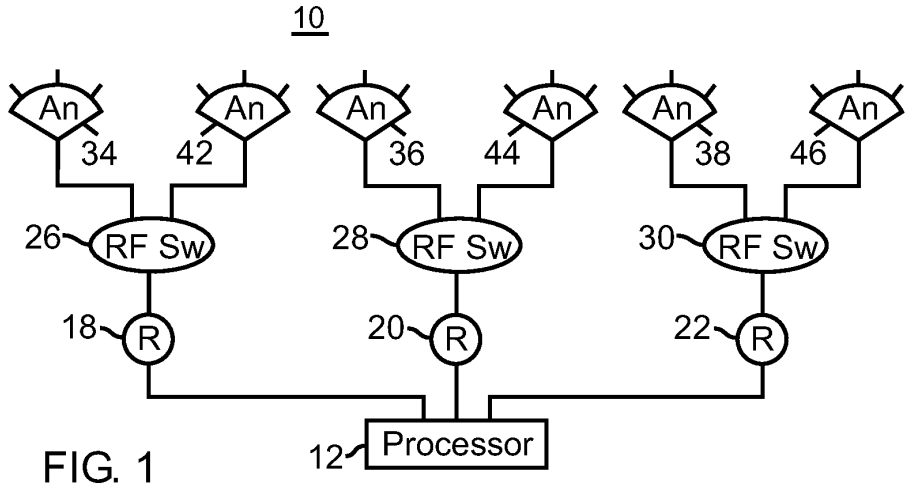


FIG. 1

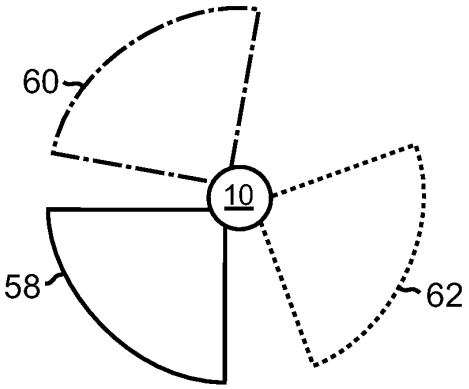


FIG. 2

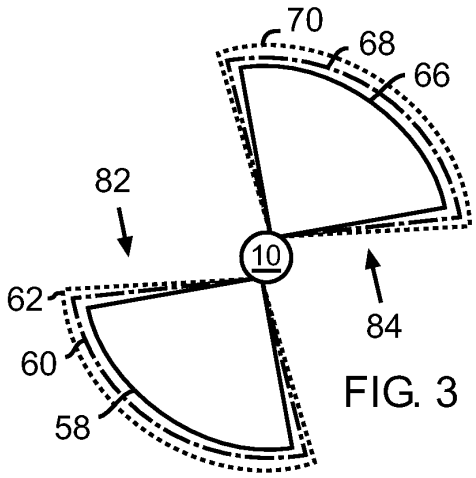


FIG. 3

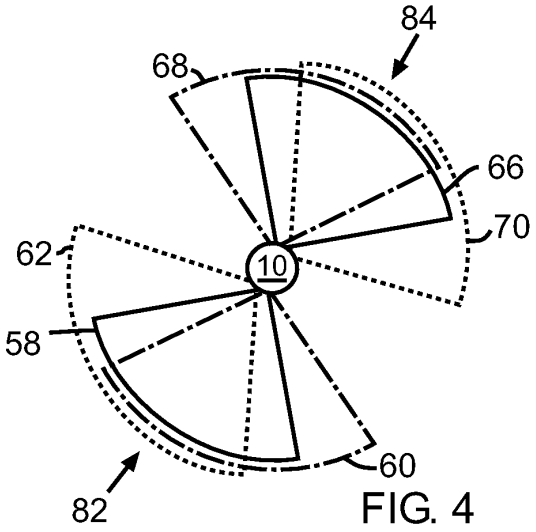


FIG. 4

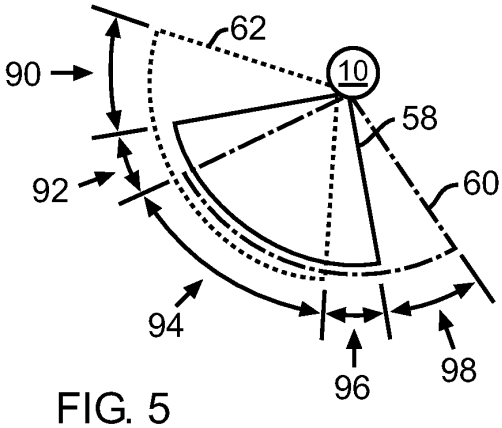


FIG. 5

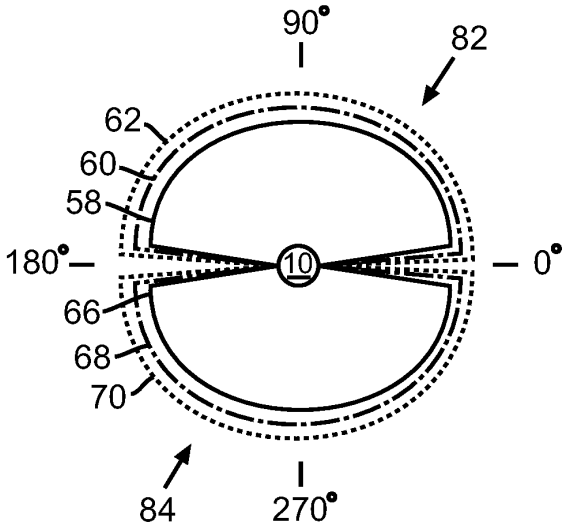


FIG. 6

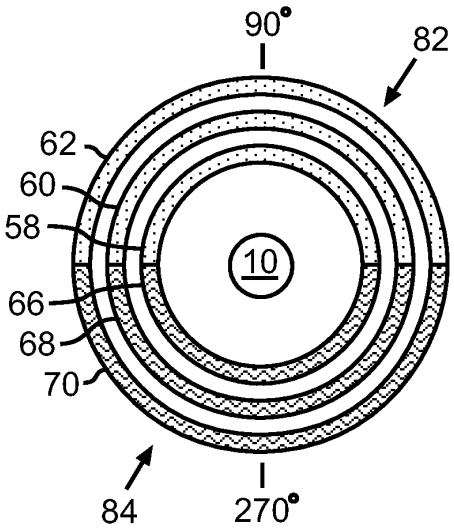


FIG. 7

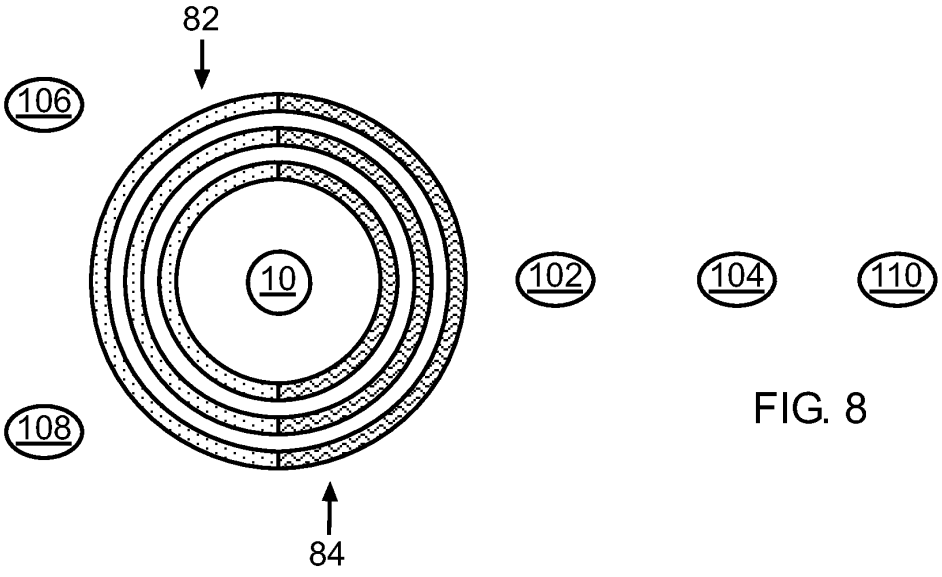


FIG. 8

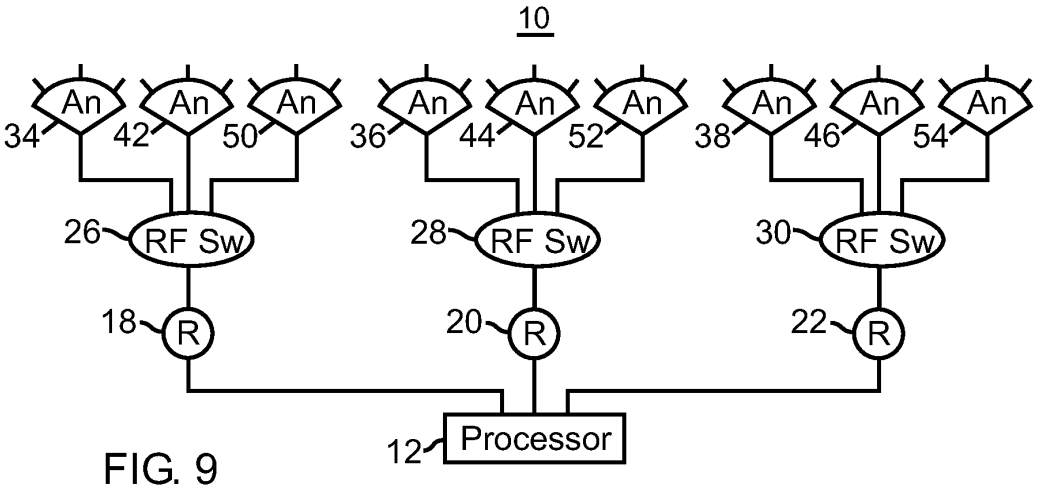

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FIG. 9

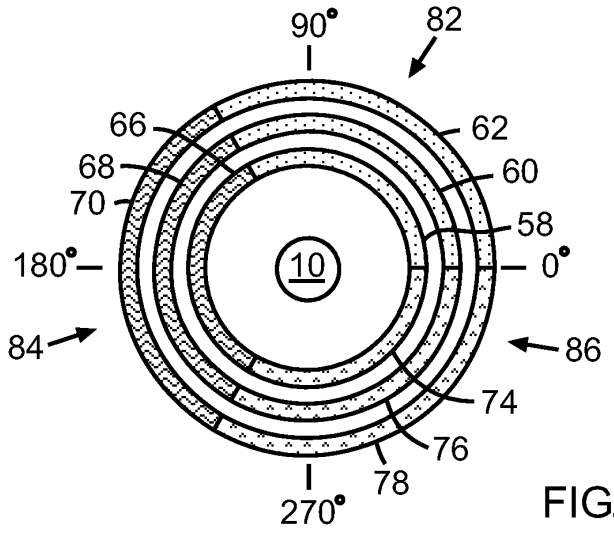

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FIG. 10

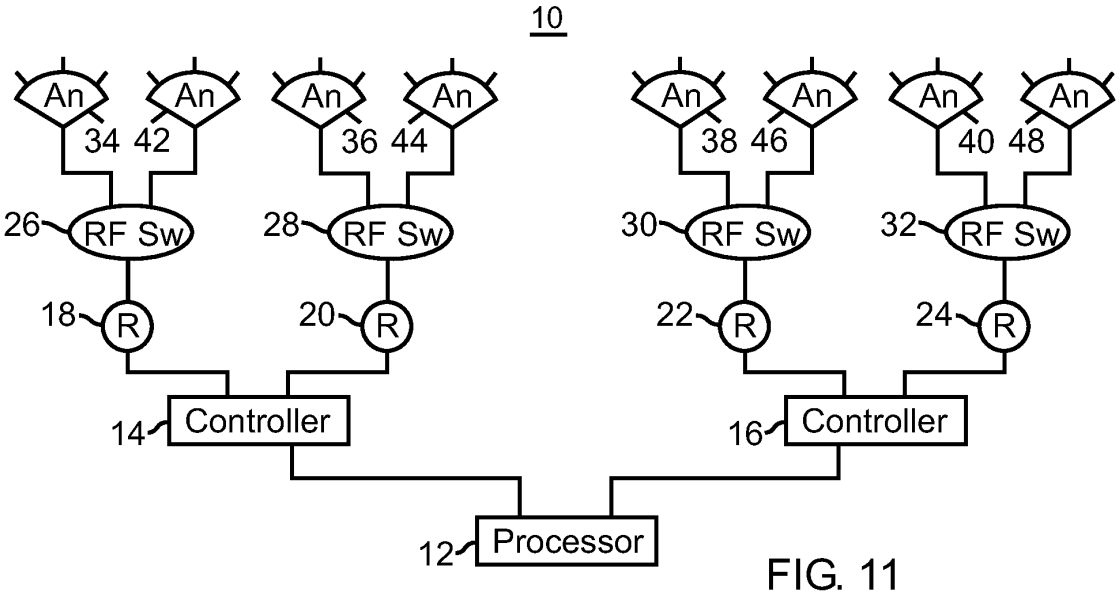

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FIG. 11

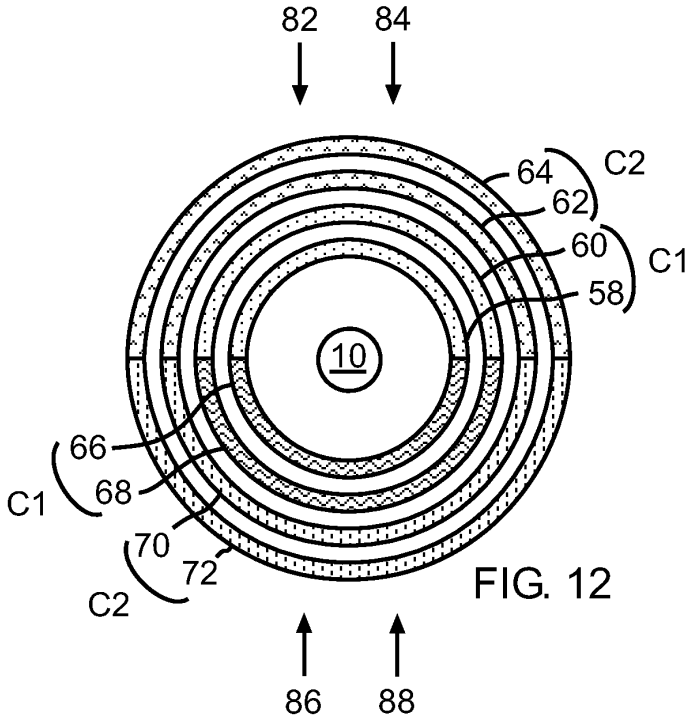

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FIG. 12

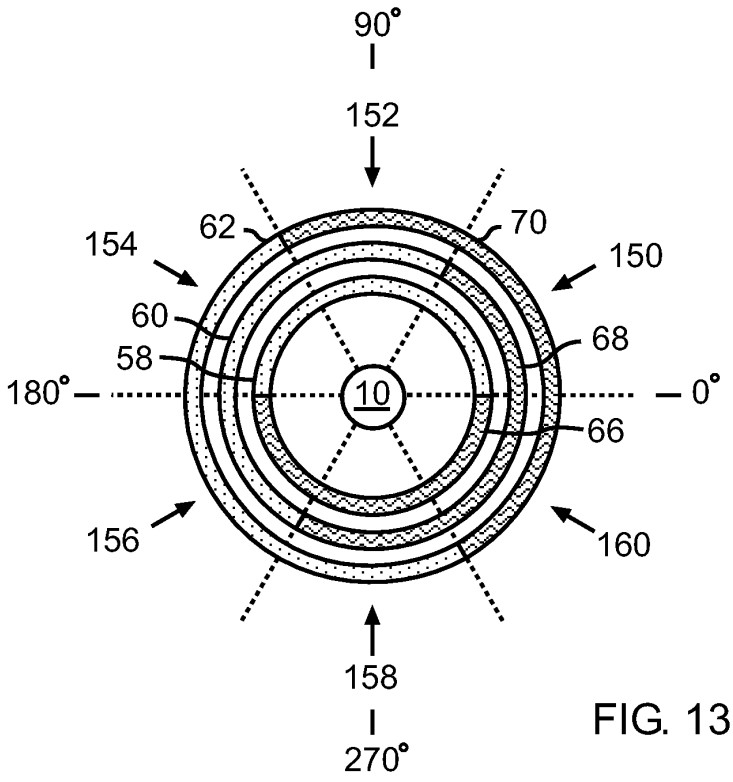

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FIG. 13

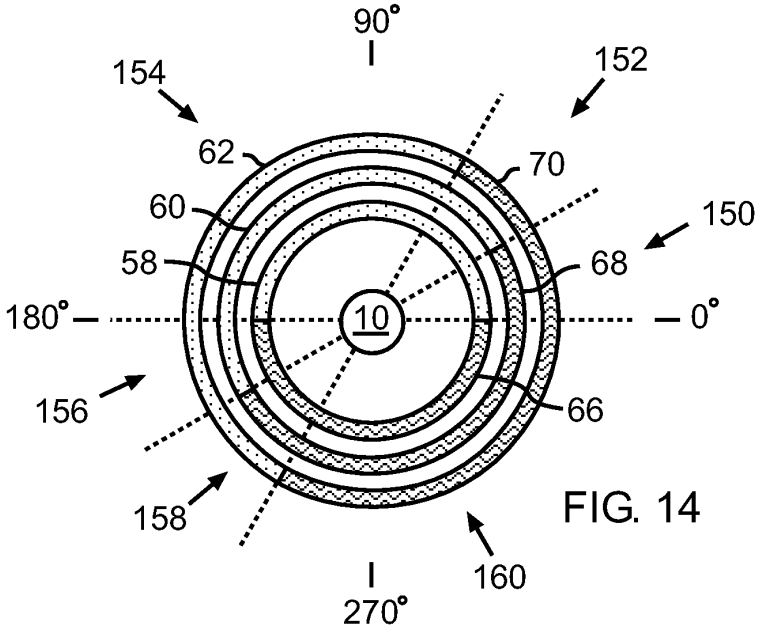

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FIG. 14

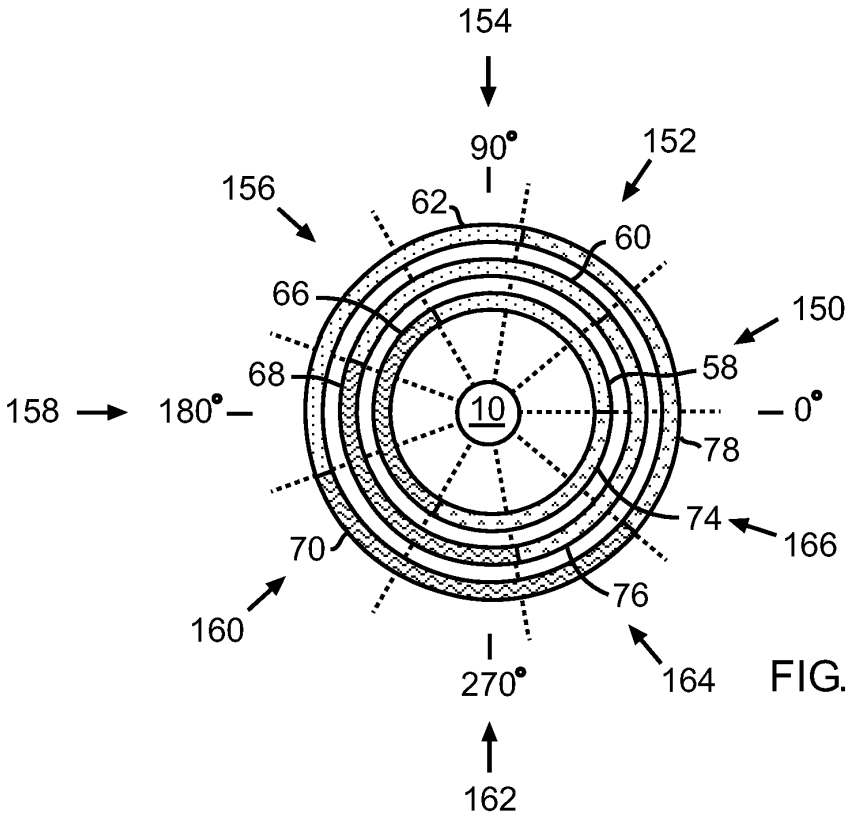

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FIG. 15

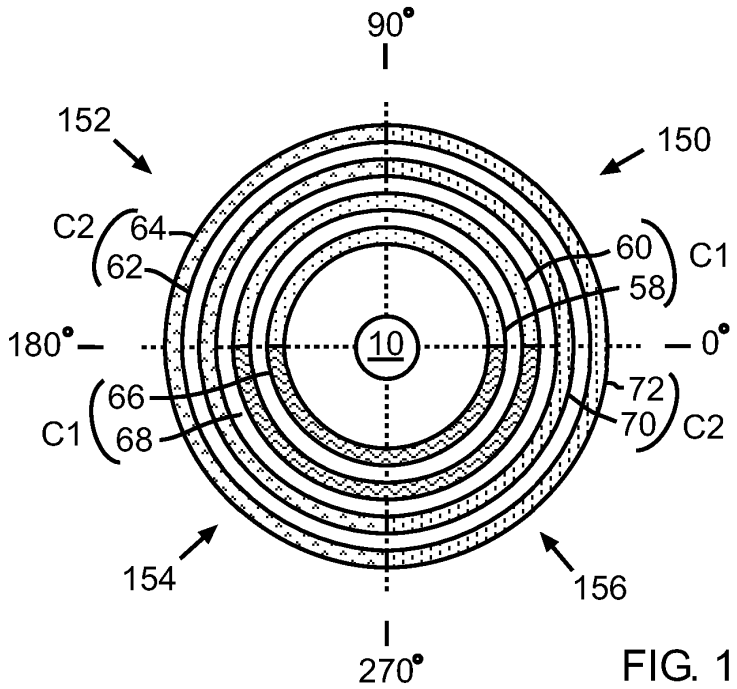

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FIG. 16

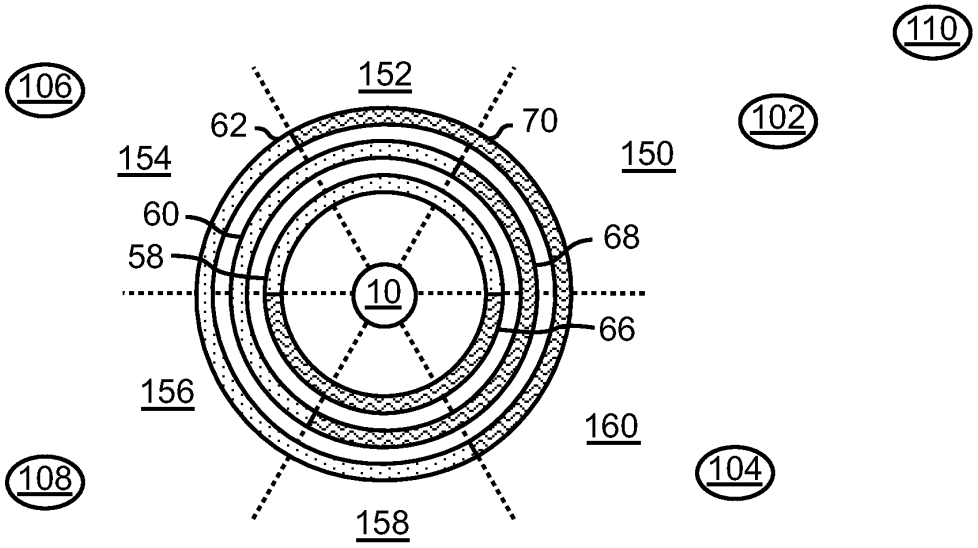

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FIG. 17

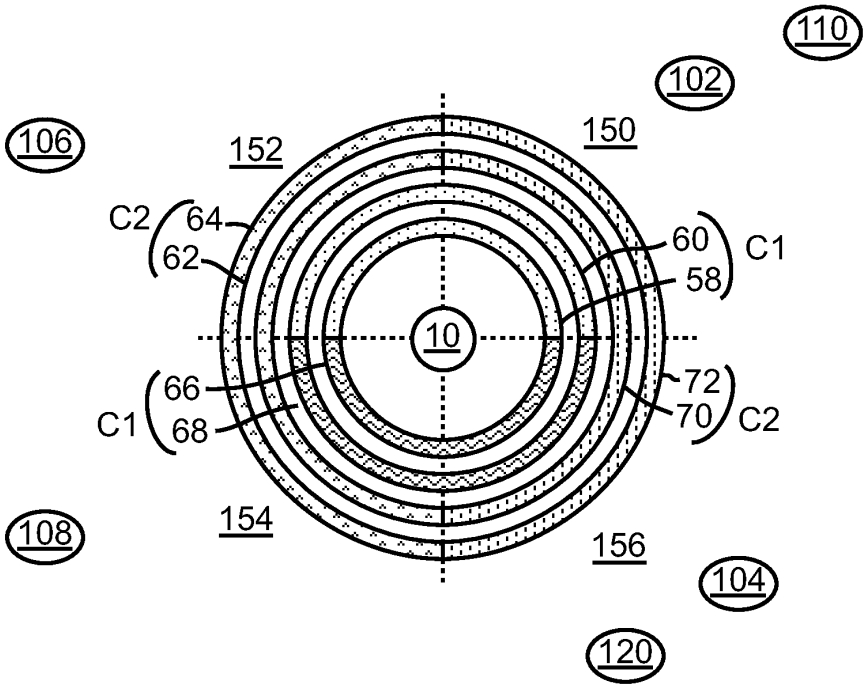

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104
120

FIG. 18

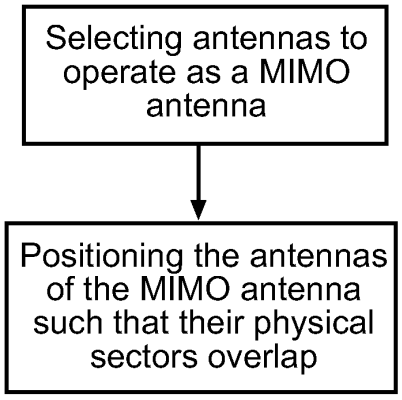

Selecting antennas to operate as a MIMO antenna
Positioning the antennas of the MIMO antenna such that their physical sectors overlap

FIG. 19

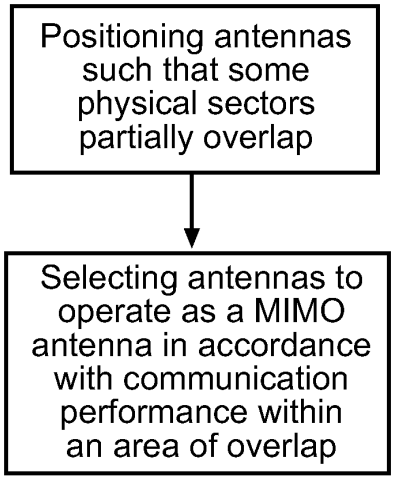

Positioning antennas such that some physical sectors partially overlap
Selecting antennas to operate as a MIMO antenna in accordance with communication performance within an area of overlap

FIG. 20

Methods and Apparatus for Overlapping MIMO Physical Sectors

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of and claims priority under 35 U.S.C. Section 120 from U.S. Patent Application Ser. No. 14/476,628 by Lastinger filed September 3, 2014, which is a continuation of U.S. Patent Application Ser. No. 13/348,523 by Lastinger filed January 11, 2012, now U.S. Pat. No. 8,855,089 which is a continuation of U.S. Patent Application Ser. No. 13/118,386 by Lastinger filed May 28, 2011, now U.S. Pat. No. 8,345,651 which is a continuation of U.S. Patent Application Ser. No. 11/709,431 by Lastinger filed Feb. 21, 2007, now U.S. Pat. No. 8,009,646, which claims priority under 35 U.S.C. sctn.119(e) from U.S. Provisional Patent Application Ser. No. 60/743,376 filed Feb. 28, 2006, each of the aforementioned applications is herein incorporated by reference.

FIELD OF THE INVENTION

[0001] Embodiments of the present invention relate to wireless communication using Multiple Input Multiple Output ("MIMO") antennas and methods of operation.

BACKGROUND OF THE INVENTION

[0002] Wireless devices find uses in a variety of applications for example, providing communication between computers, wireless cells, clients, hand-held devices, mobile devices, and file servers. Wireless devices with Multiple Input Multiple Output ("MIMO") antennas benefit from spatial diversity and redundant signals. Noise sources may interfere with wireless devices that use MIMO antennas. Wireless communication using devices having MIMO antennas may substantially benefit from selecting a MIMO physical sector and/or a MIMO virtual sector to improve performance.

SUMMARY OF THE INVENTION

[0003] A system is provided comprising a single wireless cell configured to operate in a packet-switched cellular network, the single wireless cell including: a first transmission point with a multiple-input-multiple-output (MIMO) capability; a second transmission point with a

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MIMO capability; and third circuitry in communication with first circuitry of the first transmission point and second circuitry of the second transmission point. The single wireless cell is configured such that the first transmission point cooperates with the second transmission point in connection with a first transmission to a MIMO-capable portable wireless device, for improving the first transmission. The single wireless cell is further configured for: receiving first information from the first MIMO-capable portable wireless device; receiving second information from the first MIMO-capable portable wireless device; altering at least one aspect of the first transmission; and transmitting data in connection with the first transmission to the first MIMO-capable portable wireless device.

BRIEF DESCRIPTION OF THE DRAWING

[0004] Embodiments of the present invention will now be further described with reference to the drawing, wherein like designations denote like elements, and:

[0005] FIG. 1 is a diagram of an exemplary wireless device according to the various aspects of the present invention;

[0010] FIG. 2 is a diagram of exemplary physical sectors;

[0011] FIG. 3 is a diagram of exemplary physical sectors that form exemplary MIMO physical sectors;

[0012] FIG. 4 is a diagram of exemplary MIMO virtual sectors;

[0013] FIG. 5 is a diagram of an exemplary MIMO virtual sector;

[0014] FIG. 6 is a diagram of exemplary MIMO virtual sectors;

[0015] FIG. 7 is a diagram of exemplary alternate method for diagrammatically indicating physical sectors, MIMO physical sectors, and MIMO virtual sectors;

[0016] FIG. 8 is a diagram of communication between exemplary wireless devices in the presence of noise sources;

[0017] FIG. 9 is a diagram of an exemplary wireless device having three radios and three antennas for each radio;

[0018] FIG. 10 is a diagram of exemplary physical sectors that form exemplary MIMO physical sectors;

[0019] FIG. 11 is a diagram of an exemplary wireless device having two radio groups, each group having two radios and two antennas for each radio;

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[0020] FIG. 12 is a diagram of exemplary physical sectors that substantially overlap to form exemplary MIMO physical sectors;

[0021] FIG. 13 is a diagram of exemplary physical sectors that partial overlap to form exemplary MIMO virtual sectors;

[0022] FIG. 14 is a diagram of exemplary physical sectors that partial overlap to form exemplary MIMO virtual sectors;

[0023] FIG. 15 is a diagram of exemplary physical sectors that partial overlap to form exemplary MIMO virtual sectors;

[0024] FIG. 16 is a diagram of exemplary physical sectors that substantially overlap to form exemplary MIMO physical sectors and exemplary MIMO physical sectors that partially overlap to form exemplary MIMO physical sectors;

[0025] FIG. 17 is a diagram of communication between exemplary wireless devices in the presence of noise sources;

[0026] FIG. 18 is a diagram of communication between exemplary wireless devices in the presence of exemplary noise sources;

[0027] FIG. 19 is a diagram of a method for forming MIMO physical sectors; and

[0028] FIG. 20 is a diagram of a method for forming MIMO physical sectors.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] Wireless devices use antennas to transmit and receive radio signals. Noise sources, such as other wireless devices including wireless devices that transmit on the same channel, may interfere with wireless communication. Conventional wireless devices use a variety of techniques to reduce the detrimental effect of noise on communication for example, dividing the area of coverage into sectors, using directional antenna, and using multiple antennas to provide redundancy and spatial diversity.

[0030] An improved wireless device, according to the various aspects of the present invention includes directional antennas positioned in such a way that the physical sectors of the antennas of the wireless device overlap and the antennas selected for communication are the antennas whose physical sectors overlap in an area in a manner that permits the antennas to operate as a Multiple Input Multiple Output ("MIMO") antenna.

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[0031] The wireless device, according to the various aspects of the present invention may select for communication any suitable combination of directional antennas that operate as a MIMO antenna and are oriented in a desired direction of communication. Furthermore, the wireless device may assign any available channel to the antennas to improve performance.

[0032] A wireless device, according to the various aspects of the present invention includes, for example, wireless cells, access points, wireless clients, mobile computers, and handheld devices.

[0033] The term "physical sector" is understood to mean the area of coverage in which an antenna transmits and receives signals. The size and shape of a physical sector depends on a variety of factors for example, the type of antenna, atmospheric conditions, presence of noise sources, and physical surroundings. Physical sectors 58, 60 and 62 represent the two-dimensional shape of idealized physical sectors of directional antennas. Physical sectors 58, 60 and 62 do not overlap in FIG 2. Physical sectors 58, 60 and 62 substantially overlap in FIG. 3. Physical sectors 58, 60 and 62 partially overlap in FIGs. 4 and 5.

[0034] The term "MIMO antenna" is understood to mean at least two antennas that each transmits and/or receives signals on the same channel in the area where the physical sectors of the antennas overlap. Antennas may be positioned in such a way that their physical sectors overlap. Antennas whose physical sectors overlap in the same area may be configured to operate as a MIMO antenna in that area. Each individual antenna of a MIMO antenna operates on the same channel (e.g., frequency, encoding, or other method of dividing the radio spectrum for communication). A MIMO antenna provides, *inter alia*, spatial diversity between the antennas, redundancy, and temporal diversity to reduce the effects of noise on transmission and reception. Reducing the effects of noise permits a wireless device to communicate more reliability.

[0035] Antennas that form a MIMO antenna may be oriented to use different signal polarization for example, horizontal, vertical, and circular. Antennas that form a MIMO antenna may be physically separated to provide spatial diversity.

[0036] MIMO physical sectors are formed to provide communication with increased immunity to noise within the area of the MIMO physical sector. The term "MIMO physical sector" means the area where the physical sectors of the antennas that operate as a MIMO antenna overlap.

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[0037] In an exemplary embodiment, referring to FIG. 3, physical sectors 58, 60, and 62 substantially overlap to form MIMO physical sector 82. Physical sectors 66, 68, and 70 substantially overlap to form a MIMO physical sector 84. In this embodiment, each MIMO physical sector has an angle of coverage of about 90 degrees. In another embodiment, referring to FIG. 6, each one physical sector 58, 60, and 62 and each one physical sector 66, 68, and 70 has an angle of coverage of about 180 degrees, thus the resulting MIMO physical sectors 82 and 84 have an angle of coverage of about 180 degrees. FIG. 7 represents an alternate method for diagrammatically representing physical sectors and MIMO physical sectors. Physical sectors 58 – 62 respectively have about a 180 degree angle of coverage and the center of each physical sector is oriented at approximately 90 degrees (straight up on the page). Each physical sector 58 – 62 extends from wireless device 10 to the furthest extent reached by the respective antennas even though FIG. 7 shows gaps between the physical sectors for clarity. The MIMO physical sectors 82 and 84 of FIGs. 6 and 7 are equivalent; however, the diagrammatical representation of FIG. 7 provides greater clarity. Thus, MIMO physical sectors 82 and 84 respectively include three substantially overlapping physical sectors 58 – 62 and 66 – 70.

[0038] The physical sectors of the antennas that form a MIMO antenna are not limited to being substantially overlapping. When physical sectors only partially overlap, the MIMO physical sector is the area where the physical sectors of the antennas that form the MIMO antenna overlap. Referring to FIGs. 4 and 5, the antennas associated with physical sectors 58 – 62 transmit and receive using the same channel. Area 94 is the area where physical sectors 58, 60, and 62 overlap, thus area 94 is a MIMO physical sector. The antennas associated with physical sectors 58 – 62 operate as a MIMO antenna in area 94. The MIMO physical sector formed by physical sectors 66 – 70 is also shown in FIG. 4 as MIMO physical sector 82.

[0039] MIMO physical sectors may be formed in a variety of ways. In one exemplary method for forming a MIMO physical sector, referring to FIG. 19, antennas are selected to operate as a MIMO antenna then the antennas are positioned in such a way that the physical sectors of the antennas overlap. In another exemplary method for forming a MIMO physical sector, referring to FIG. 20, a plurality of antennas are positioned in such a way that the physical sectors of at least some of the antennas at least partially overlap then at least two antennas are selected to operate as a MIMO antenna in the area where their physical sectors overlap to form a MIMO physical sector. The plurality of antennas may be positioned in such a way that the

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various MIMO physical sectors that are formed are oriented in different directions. At least two antennas may be selected to operate as a MIMO antenna in accordance with the orientation of the MIMO physical sector formed by the physical sectors of the selected antennas. The orientation of some MIMO physical sectors may provide increased performance over the orientation of other MIMO physical sectors. Furthermore, the antennas that form the MIMO antenna may be assigned any available channel. Accordingly, the selected antennas, thus the MIMO physical sector, may be assigned to a channel that provides improved performance.

[0040] The term "MIMO virtual sector" means the area where the physical sectors of antennas that may operate as a MIMO antenna overlap. Referring to FIG. 13, physical sectors 58 – 62 and 66 – 70 each have an angle of coverage of about 180 degrees respectively. The antennas associated with physical sectors 58 – 62 and 66 – 70 are positioned in such a way that in area 150, physical sectors 58, 68, and 70 overlap. In area 152, physical sectors 58, 60, and 70 overlap and so forth for areas 154 – 160. Each one area 150 – 160 comprises a MIMO virtual sector because the antennas whose physical sectors overlap in the area may operate as a MIMO antenna. If the antennas associated with physical sectors 58, 68, and 70 are selected to form a MIMO antenna, then area 150 operates as a MIMO physical sector. If the antennas associated with physical sectors 58, 60, and 70 are selected to form a MIMO antenna, then area 152 operates as a MIMO physical sector and so forth for the other areas. Before antennas are selected to form a MIMO physical sector, areas 150 – 160 are MIMO virtual sectors. When antennas are selected to form a MIMO antenna, the area where the physical sectors of the selected antennas overlap become a MIMO physical sector while the other areas remain MIMO virtual sectors. A MIMO physical sector may also be referred to as a selected MIMO virtual sector or an active MIMO virtual sector. Any criteria may be used to select a MIMO virtual sector for communication.

[0041] The method of positioning antennas to form MIMO virtual sectors then selecting antennas to operate as a MIMO antenna permits the wireless device to respond to changes in, *inter alia*, performance, noise sources, and the environment by communicating through the MIMO physical sector that provides increased performance.

[0042] Positioning antennas to form MIMO virtual sectors permits a wireless device with fixed antenna positions to select from a variety of MIMO virtual sectors to communicate using the MIMO physical sector that provides a desired level of performance. When the performance

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of the selected MIMO physical sector deteriorates due to, *inter alia*, noise sources or environmental conditions, the wireless device can select different antennas to operate as a MIMO antenna, thereby selecting a different MIMO virtual sector to operate as a MIMO physical sector where the different MIMO physical sector provides increased performance.

[0043] MIMO physical sectors permits a wireless device to communicate with increased performance. MIMO virtual sectors permits a wireless device to select an area to transmit and receive in accordance with the MIMO virtual sector that provides a desired level of performance. A wireless device having multiple MIMO virtual sectors may select between the various MIMO virtual sectors. A wireless device may select the MIMO virtual sector that provides an increased level of performance. Positioning the antennas of a wireless device to form MIMO virtual sectors that are oriented in different directions permits the wireless device to select a MIMO physical sector based on the orientation of the virtual sector with relation to the position of noise sources.

[0044] Performance may be measure by, *inter alia*, throughput, data throughput, signal-to-noise ratio, reduced signal error, reduced data errors, reduced retransmission requests, reduced interference, rejection of multipath signals, higher transmission rates, and signal strength.

[0045] A MIMO system includes radios and antennas that may be configured to form MIMO antennas, MIMO physical sectors, and MIMO virtual sectors. A MIMO system may form a MIMO antenna using any suitable combination of radios and antennas. A MIMO system may select any suitable MIMO physical sector for communication. A MIMO system may have any suitable number of MIMO virtual sectors and/or selected MIMO virtual sectors. The MIMO system may position its MIMO physical sectors at any orientation. The MIMO physical sectors of a MIMO system may overlap other MIMO physical sectors of the same MIMO system. Overlapping MIMO physical sectors of the same MIMO system may be assigned different channels.

[0046] A MIMO system has at least two radios and at least two antennas where at least two radios and two antennas form a MIMO antenna. In another exemplary embodiment, referring to FIG. 1, a MIMO system has three radios with two antennas interfacing with each one radio. Three antennas, one antenna from each radio, may operate as a MIMO antenna, thereby resulting in a MIMO system having two MIMO antennas.

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[0047] The present invention may employ various types of radios using any type of communication protocol and operating at any frequency and/or with any number of channels suitable for the application. The present invention may use any variety of antennas or groups of antennas for any purpose for example, transmission, reception, noise reduction, and multipath detection. Antennas may be positioned in any manner for example, their physical sectors may be overlapping and non-overlapping. Radios and antennas may operate as a MIMO system, MIMO antennas, MIMO physical sectors, and MIMO virtual sectors. Any type of algorithm and/or processor may be used to enable radios and/or antennas to form and operate as MIMO antennas. Antennas may be selected for communication according to any criteria such as for example, data throughput, signal strength, signal quality, and signal-to-noise ratio.

[0048] In one embodiment, the antennas of the wireless device are positioned to form non-overlapping MIMO physical sectors and one of the non-overlapping MIMO physical sectors is selected for communication with other wireless devices. In another embodiment, the antennas of the wireless device are positioned to form overlapping MIMO virtual sectors and some of the MIMO virtual sectors are selected for communication with other wireless devices.

[0049] The antennas that form a MIMO antenna may be used in any manner to transmit and/or receive signals for example, any number of antennas that operate as the MIMO antenna may transmit only, receive only, and transmit and receive signals.

[0050] In an exemplary embodiment, referring to FIG. 1, antennas 34, 36, and 38, with their associated radios, form a MIMO antenna in which each antenna 34, 36, and 38 transmits and receives the same signals. In another embodiment, antennas 34 – 38 form a MIMO antenna in which antenna 34 transmits, antenna 36 receives only, and antenna 38 transmits and receives. Different MIMO antenna configurations may provide different communication characteristics. For example, a configuration where all antennas of the MIMO antenna transmit and receive the same information may provide increased error correction. A configuration where antennas transmit and/or receive different information may provide increased data throughput. In an configuration where each antenna of the MIMO antenna receives some version of the same signal, the information content of the various signal versions received by the antennas of the MIMO antenna may be highly similar and/or less similar depending on environmental conditions for example, the presence of noise sources, multipath reflections, and spatial diversity of the antennas. Advanced algorithms may be used to process the signal received by each antenna that

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form the MIMO antenna to construct a resultant receive signal that contains as much of the receive signal information as can be extracted. The antennas of a MIMO antenna may be configured to receive signals from a common source by positioning the antennas such that their physical sectors overlap.

[0051] The number of antennas used to form a MIMO physical sector and the overlap of the physical sectors of the antennas may affect performance. For example, referring to FIGs. 1 and 5, area 90 receives coverage from only physical sector 62, thus communications within area 90 are transmitted and received by only antenna 38. Likewise, area 98 receives coverage only from physical sector 60 and antenna 36. Even when antennas 36 and 38 are selected to operate as a MIMO antennas, areas 90 and 98 are not MIMO physical sectors because only one antenna operates in the area. When only one antenna of the antennas selected to operate as a MIMO antenna transmits and receives in an area, the performance may not be as high as in the areas where the physical sectors of the antennas overlap to form a MIMO physical sector. Areas 92 and 96 receive coverage from physical sectors 58, 62 and 58, 60 respectively. Areas 92 and 96 are MIMO physical sectors because at least two antennas operate as a MIMO antenna in the areas. Communication using at least two antennas of the antennas selected to operate as a MIMO antenna may improve performance. Area 94, a MIMO physical sector formed by the overlap of the physical sectors of three antennas, receives coverage from physical sectors 58, 60 and 62 and their related antennas 34 – 38. Antennas 34 – 38 operate as a MIMO antenna, thus reception and/or transmission through all three antennas in area 94 may provide higher performance than reception and/or transmission through areas 90 – 92 and 96 – 98. The MIMO physical sector in area 94 is most likely to provide improved performance because all antennas of the MIMO antenna communicate in area 94.

[0052] MIMO physical sectors formed using directional antennas may use conventional antenna select methods to reduce interference from noise sources. For example, referring to FIGs. 1 and 8, wireless device 10 comprises processor 12, radios 18 – 22, RF switches 26 – 30, and antennas 34 – 38 and 42 – 46 where two antennas interfacing with each one RF switch respectively. Antennas 34 – 38 and 42 – 46 operate as a first MIMO antenna and a second MIMO antenna respectively. Radios 18 – 22 use the 802.11a/b/g/n communication protocols. Antenna physical sectors 58 – 62, associated with antennas 34 – 38 respectively, substantially overlap to form MIMO physical sector 82. Antenna physical sectors 66 – 70, associated with

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antennas 42 – 46 respectively, substantially overlap to form MIMO physical sector 84. In this embodiment, each radio is set to the same channel. The physical sectors and the MIMO physical sectors 82 – 84 extend farther than shown in FIG. 8 to enable wireless device 10 to communicate with wireless device 102 and receive interference from noise sources 106 and 108. Wireless device 10 uses RF switches 26 – 30 to select between antennas 34 – 38 and 42 – 46. In this embodiment, the RF switches select between one of two groups of antennas; either antennas 34 – 38 or antennas 42 – 46 are selected, thus only one MIMO physical sector, either 82 or 84, is active at any given time. In the embodiment and the scenario described in FIG. 8, wireless device 10 selects MIMO antennas physical sector 84 to reduce interference from noise sources 106 and 108 while communicating with wireless device 102. Wireless device 104 of FIG. 8 may also be implemented using MIMO physical sectors similar to those of wireless device 10. Wireless device 104 may select the MIMO physical sector that provides the best performance while communicating with wireless device 102 and reduces interference from noise source 110.

[0053] In another embodiment of a MIMO system, referring to FIG. 9, wireless device 10 comprises a processor 12, three radios 18 – 22, three RF switches 26 – 30, and three antennas interfacing with each RF switch. Antennas 34 – 38, 42 – 46, and 50 – 54 may have any angle of coverage, be oriented in any direction, form MIMO antennas, and form MIMO virtual sectors in any manner. In an exemplary embodiment, referring to FIG. 10, each antenna 34 – 38, 42 – 46, and 50 – 54 has an angle of coverage of about 120 degrees. Antennas 34 – 38 are oriented so that their associated physical sectors, 58 – 62 respectively, substantially overlap to form MIMO physical sector 82. Antennas 42 – 46 are oriented so that their associated physical sectors, 66 – 70 respectively, substantially overlap to form MIMO physical sector 84. Antennas 50 – 54 are oriented so that their associated physical sectors, 74 – 78 respectively, substantially overlap to form MIMO physical sector 86. Physical sectors 58 – 62, 66 – 70, and 74 – 78 are oriented such that the center of MIMO physical sectors 82, 84, and 86 are respectively oriented at about 60, 180, and 300 degrees respectively. In this embodiment, the MIMO physical sectors do not substantial overlap. Each radio is set to the same channel, thus the MIMO physical sectors 82 – 86 each use the same channel. The wireless device embodiment of FIGs. 9 and 10 may also be used to reduce interference with noise sources by selected one of the three MIMO physical sectors for communication.

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[0054] In another embodiment, not shown, wireless device 10 comprises a processor, four radios, an RF switch interfacing with each one radio, and four directional antennas interfacing with each one RF switch. Each antenna has an angle of coverage of about 90 degrees. The physical sectors of one antenna from each RF switch substantially overlap to form a MIMO physical sector resulting in a MIMO system having four MIMO virtual sectors. Each MIMO physical sector receives coverage from each one of the four radios. The physical sectors of the antennas are oriented in such a way that the MIMO physical sectors do not overlap and the MIMO physical sectors provide a combined angle of coverage of about 360 degrees. All radios are set to the same channel.

[0055] In another embodiment, not shown, wireless device 10 comprises a processor, two radios interfacing with the processor, an RF switch interfacing with each one of the radios, and three directional antennas interfacing with each one RF switch. Each antenna has an angle of coverage of about 120 degrees. The physical sectors of one antenna from each one RF switch substantially overlap to form a MIMO physical sector resulting in a MIMO system having three MIMO virtual sectors. Each MIMO physical sector receives coverage from each one of the two radios. The physical sectors of the antenna are oriented in such a way that the MIMO physical sectors do not overlap and the MIMO physical sectors provide a combined angle of coverage of about 360 degrees. All radios are set to the same channel.

[0056] In another embodiment, not shown, wireless device 10 comprises a processor, two radios interfacing with the processor, an RF switch interfacing with each one of the radios, and "N" directional antennas interfacing with each one RF switch. Each antenna has an angle of coverage of about 360 degrees divided by N. Two antennas, one from each RF switch, form a MIMO antenna, thereby forming N MIMO antennas. The physical sectors of the antennas that form each MIMO antenna substantially overlap to form N MIMO physical sectors. The MIMO physical sectors are oriented in such a way that the MIMO physical sectors do not substantially overlap, thereby providing a combined angle of coverage of about 360 degrees. All radios are set to the same channel.

[0057] Radios, antennas, and MIMO physical sectors are not limited to using a single channel for communication or to forming MIMO physical sectors that are substantially non-overlapping. Radios may be grouped to provide MIMO physical sectors that use different channels. MIMO physical sectors that communicate on different channels may be positioned to

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overlap. Overlapping MIMO physical sectors that use different channels may simultaneously communicate less mutual interference.

[0058] In one embodiment, referring to FIG. 11, wireless device 10 comprises a process 12, controllers 14, 16 interfaces with processor 10, two radios 18, 20 interface with controller 14 thereby forming a first radio group, two radios 22, 24 interface with controller 16 thereby forming a second radio group, an RF switch 26, 28, 30, 32 interfaces with radio 18, 20, 22, 24 respectively, antennas 34 – 48 interface with the RF switches in such a manner that two antennas interface with each one RF switch. The antennas may form MIMO antennas any manner; however, forming MIMO antennas using antennas from the same group enables MIMO physical sectors from different groups to operate on different channels.

[0059] In one embodiment, antennas 34 and 36 form a first MIMO antenna. Antennas 42 and 44 form a second MIMO antenna. The first and second MIMO antennas belong to the first radio group. Antennas 38 and 40 form a third MIMO antenna. Antennas 46 and 48 form a fourth MIMO antenna. The third and fourth MIMO antennas belong to the second radio group. In another embodiment, antennas 34 – 40 form a first MIMO antenna and antennas 42 – 48 form a second MIMO antenna.

[0060] The antennas and their respective physical sectors may have any angle of coverage and be oriented in any direction. The antennas of the various groups may form MIMO antennas in any manner. The resulting MIMO physical sectors may be overlapping or non-overlapping. In an exemplary embodiment, antennas 34, 36, 38, 40, 42, 44, 46, and 48 and their respective physical sectors 58, 60, 62, 64, 66, 68, 70, and 72 each have an angle of coverage of about 180 degrees. Referring to FIGs. 11 and 12, physical sector 58 substantially overlaps physical sector 60 to form MIMO physical sector 82. Physical sectors 62 and 64 substantially overlap, 66 and 68 substantially overlap, and 70 and 72 substantially overlap to form MIMO physical sectors 84, 86, and 88 respectively. The center of the angles of coverage of antennas 34, 36 and 38, 40 are oriented at about 90 degrees (e.g., up the page), thus MIMO physical sectors 82 and 84 overlap. The center of the angles of coverage of antennas 42, 44 and 46, 48 are oriented at about 270 degrees (e.g., down the page), thus MIMO physical sectors 86 and 88 substantially overlap. Radios 18 and 20 belong to the first radio group and radios 22 and 24 belong to the second radio group. Assigning channel C1 to the first radio group and channel C2 to the second radio group results in MIMO physical sectors 82 and 86 using channel C1 and MIMO physical sectors 84

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and 88 using channel C2. Thus, the channel assignment, the antenna orientation, and the MIMO antenna configurations provide overlapping MIMO physical sectors that use different channels. Referring to FIG. 12, MIMO physical sector 82 is assigned to C1, MIMO physical sector 84 is assigned to C2, and MIMO physical sector 82 substantially overlaps MIMO physical sector 84. Because MIMO physical sectors 82 and 84 are assigned different channels, they may communicate with different wireless devices simultaneously with less mutual interference. MIMO physical sectors formed using antennas from different radio groups enables the MIMO physical sectors to overlap, be assigned different channels, and communicate simultaneously. MIMO antennas of the same radio group use the same channel. Interference between MIMO physical sectors formed using antennas from the same group may be reduced by, for example, positioning the MIMO physical sectors in such a way that they do not overlap and communicating using only one MIMO physical sector from the same group at any one time.

[0061] In another embodiment, referring to FIG. 11, each one antenna 34 – 48 has a physical sector with an angle of coverage of about 90 degrees. Antennas are organized, as described above, to form four MIMO antennas. Antenna physical sectors are positioned such that the center of the angle of coverage for antennas pairs 34 and 36, 38 and 40, 42 and 44, and 46 and 48 and their respective physical sectors are oriented at 45, 135, 225, and 315 degrees respectively. Channel C1 is assigned to the first group radios and channel C2 is assigned to the second group radios. The resulting four MIMO physical sectors are positioned to not substantially overlap and adjacent MIMO physical sectors are assigned a different channel. One MIMO physical sector from the first radio group and one MIMO physical sector from the second radio group may operate simultaneously.

[0062] The antennas of wireless device 10 may be oriented to form MIMO virtual sectors. MIMO virtual sectors may have any angle of coverage and be oriented in any manner. A MIMO virtual sector may be selected for communication to decrease interference. In one embodiment, referring to FIGs. 1 and 13, antennas 34 – 38 and 42 – 46 have an angle of coverage of about 180 degrees. Antennas 34, 36, 38, 42, 44, 46 and the center of the angle of coverage of their respective physical sectors 58, 60, 62, 66, 68, 70 are oriented at 90, 150, 210, 270, 300, and 30 degrees respectively. The area between 0 and 60 degrees, marked as area 150 in FIG. 13, is covered by physical sectors 58, 68, and 70. Antennas 34, 44, and 46 may function together as a MIMO antenna to transmit signals to and receive signals from any wireless device within area

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150. Areas 152, 154, 156, 158, and 160 are respectively positioned between about 60 – 120 degrees, about 120 – 180 degrees, about 180 – 240 degrees, about 240 – 300 degrees, and about 300 – 0 degrees and are serviced respectively by antennas 34, 36, and 46; 34, 36 and 38; 42, 36 and 38; 42, 44 and 38; and 42, 44 and 46. Each one area 150 – 160 comprises a MIMO virtual sector.

[0063] In an exemplary embodiment, referring to FIGs. 1 and 13, area 150 operates as a MIMO physical sector by forming a MIMO antenna using antennas 34, 44, and 46. Area 152 operates as a MIMO physical sector by forming a MIMO antenna using antennas 34, 36, and 46, and so forth for areas 154 – 160. In this embodiment, areas 158 and 160 may not be combined to operate as a MIMO physical sector because area 158 requires antennas 42, 44, and 38 to form a MIMO antenna while area 160 requires antennas 42, 44, and 46 to form a MIMO antenna. Because RF switch 30 selects only one antenna at a time, MIMO physical sectors, for this embodiment, are limited to any combination of any one antenna associated with each RF switch. In this embodiment, wireless device 10 may select and communicate through any one MIMO virtual sector at any given time. The method of selecting the MIMO virtual sector consists of setting the RF switches to select the antennas that service the desired MIMO virtual sector. In another embodiment, an RF switch with its associated antennas may be replaced by a phased array. Antenna elements of each phased array may form MIMO antennas.

[0064] Antennas may be oriented in any manner to form MIMO virtual sectors of any size. In an exemplary embodiment, referring to FIG. 13, each MIMO virtual sector 150 – 160 has an angle of coverage of about 60 degrees. In another embodiment, referring to FIG. 14, MIMO virtual sectors 150, 152, 154, 156, 158, and 160 lie between 0 – 30 degrees, 30 – 60 degrees, 60 – 180 degrees, 180 – 210 degrees, 210 – 240 degrees, and 240 – 0 degrees respectively. In another embodiment, referring to FIG. 15, each MIMO virtual sector has an angle of coverage of about 40 degrees. MIMO virtual sectors 150 – 166 lie between 0 – 40 degrees, 40 – 80 degrees, 80 – 120 degrees, 120 – 160 degrees, 160 – 200 degrees, 200 – 240 degrees, 240 – 280 degrees, 280 – 320 degrees, and 320 – 0 degrees respectively. In another embodiment, referring to FIGs. 11 and 18, each MIMO virtual sector has an angle of coverage of about 90 degrees. Channel C1 is assigned to the first group radios and channel C2 is assigned to the second group radios. Antenna pairs 34 and 36, 38 and 40, 42 and 44, and 46 and 48 respectively form MIMO antennas. MIMO virtual sectors formed by antennas 34, 36 and 42, 44 extend from 0 – 180 and

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180 - 0 degrees respectively and are assigned channel C1. MIMO virtual sectors formed by antennas 38, 40 and 46, 48 extend from 90 – 270 and 270 - 90 degrees respectively and are assigned channel C2. The MIMO virtual sectors are positioned to form areas 150 – 156 which each receive coverage from two MIMO virtual sectors that operate on different channels.

[0065] A wireless device may select and communicate through a MIMO virtual sector to improve performance. A wireless device may use any criteria for selecting a MIMO virtual sector for communication such as, for example, the presence of noise sources, noise source channels used, signal-to-strength ratio, direction of primary data flow, signal quality, signal strength, and data throughput.

[0066] In one embodiment, referring to FIGs. 9 and 17, wireless device 10 desires to communicate with wireless device 102. Wireless device 10 successively enables each antenna combination that forms each MIMO virtual sector 150 – 160. Through each MIMO virtual sector, wireless device 10 measures its ability to communicate with wireless device 102. Through at least MIMO virtual sector 150, wireless device 10 detects the presence of noise source 110. Through at least MIMO virtual sectors 154 and 156, wireless device 10 detects the presence of noise sources 106 and 108 respectively. While communicating with wireless device 102, wireless device 10 may reduce interference from noise sources 106 and 108 by selecting and communicating through MIMO virtual sector 150. In the embodiment of wireless device 10 shown in FIGs. 1 and 17, areas adjacent to the selected MIMO virtual sector have at least one antenna in common, thus selecting a MIMO virtual sector does not disable all communication in other sectors, but communication within the selected MIMO virtual sector may provide increased performance than adjacent areas because it transmits and/or receives using all the antennas that form the MIMO antenna.

[0067] Referring still to FIGs. 1 and 17, wireless device 10 may reduce interference from noise source 110 by selecting a channel that is different from the channel used by noise source 110. In the event that wireless device 102 cannot switch to a channel that is not used by noise source 110, communication with wireless device 102 may proceed using MIMO virtual sector 150 if it provides a desired level of performance. A wireless device may select any MIMO virtual sector that provides a desired level of performance. In this embodiment, wireless device 10 may select MIMO virtual sector 152 to communicate with wireless device 102. Wireless device 10 may detect less interference from noise source 110 through MIMO virtual sector 152

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than it detects through MIMO virtual sector 150, but wireless device 10 may also receive a less desirable signal from wireless cell 102. In the event that wireless device 10 desires to communicate with wireless device 104 and noise sources 106, 108, and 110 all operate on the same channel as wireless device 104, wireless cell 10 may reduce interference from the noise sources by selecting MIMO virtual sector 160 for communicating with wireless device 104. A wireless device may select and use any MIMO virtual sector for any duration of time. A wireless device may switch from using one MIMO virtual sector to using any other MIMO virtual sector at any time and for any purpose. In an exemplary embodiment, referring to FIG. 17, wireless device 10 switches between MIMO virtual sectors 150 and 160 to communicate with wireless devices 102 and 104 respectively. Additionally, a wireless device may transmit through one MIMO virtual sector and receive through a different MIMO virtual sector. In another embodiment, referring to FIGs. 11 and 18, wireless device 10 may select the MIMO virtual sector that provides a desired level of communication for each area. Additionally, wireless device 10 may communicate with two wireless devices 104 and 120, both in area 156, simultaneously on different channels; for example, wireless device 104 communicates using channel C1 while wireless device 120 communicates using channel C2.

[0068] Unless contrary to physical possibility, the inventor envisions the methods and systems described herein: (i) may be performed in any sequence and/or combination; and (ii) the components of respective embodiments combined in any manner.

[0069] This application incorporates by reference U.S. provisional application serial number 60/484,800 filed on July 3, 2003; U.S. provisional application serial number 60/493,663 filed on August 8, 2003; U.S. provisional application serial number 60/692,490 filed on June 21, 2005; U.S. utility application serial number 10/869,201 filed on June 15, 2004 and issued under U.S. Pat. No: 7,302,278; and U.S. utility application serial number 10/880,387 filed on June 29, 2004 and issued under U.S. Pat. No: 7,359,675, in their entirety for the teachings taught therein.

[0070] The wireless cell can ask the advanced client to measure and report communication statistics such as, but not limited to, bit error rate, signal-to-noise ratio, dropped bits, signal strength, number of retransmission requests or any other environmental or communication parameter. Each antenna and antenna controller functions independently of the other antennas and controllers.

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[0071] The antenna controller sets the beam width, beam azimuth, beam steering, gain of the antenna and any other parameter available on adjustable antennas. The antennas are also capable of high-speed switching. The controllable characteristics of the antenna are dynamically modifiable. The antenna beam can steer directly at one receiving client during transmission then pointed at a second client when transmission to the second client begins. The beam width of the antenna can be increased or decreased as necessary; however, it is preferable to not increase the beam width to provide antenna coverage beyond the width of a sector. If the beam width is adjusted to provide coverage wider than a sector, the radio signal may interfere with adjacent or opposing sectors or wireless cells or detect clients not associated with the sector or wireless cell. The processor is responsible for tracking the antenna characteristics best suited to service each client in the sector covered by the antenna and to set the antenna controller to the parameters best suite for the particular client when communicating with the client. The use of an adjustable antenna, an antenna controller and a processor capable of controlling the antenna controller is not limited to the six-sector embodiment of a wireless network, but can also be used in a four-sector wireless cell or other wireless cell types. Preferably, the beam width would not exceed the width of the sector of the wireless cell in which it is used.

[0072] MIMO antennas may use any combination of spatial, polarization, or angle antenna diversity. The MIMO antenna array may be fixed or adaptive for either transmit, receive, or both. When receiving, the MIMO antenna may use, for example, a maximum ratio combiner, an optimal linear combiner, selection diversity, or any combination of these methods or other methods for combining the signals from multiple antennas into a single signal. When transmitting, the MIMO antenna may use any type of encoding including, for example, OFDM, space-time-codes, or weighting of the antenna signals in the array to accomplish beam steering.

[0073] During transmission or reception, all or any subset of antennas in the MIMO array may be used or selection diversity may be used to limit the number of antennas used.

[0074] Antenna diversity may be used in the transmit path, in the receive path, or in both transmit and receive paths. The signal from each antenna, transmitted or received, may or may not be weighted.

[0075] Servicing a physical sector with a MIMO antenna means that all antennas in the MIMO array use the channel assigned to the physical sector. Signal attenuation may be added

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after each antenna, after the signal combiner, or in the signal processor that manipulates the incoming signals.

[0076] Although MIMO antennas are arrays of antennas, any antenna array may be used as a single antenna or a MIMO antenna may be used. For example, a directional antenna with about 120-degree angle of coverage may be replaced by an antenna array that provides similar coverage. The array may be fixed or adaptive. Adaptive arrays may use adaptive array weights to transmit directional beams within the angle and area of coverage to send a stronger signal to a desired client. During reception, an adaptive array may use array weights to direct a beam substantially towards the transmitting client and substantially null out any sources of interference.

[0077] The processor, in exemplary embodiments, in addition to getting receive data from and sending transmit data to the radios, may also send instructions to control the radios such as, for example, instructing a radio to change channels or getting control information from the radios. In exemplary embodiments, the processor may also be capable of, for example, varying attenuation, controlling any or all RF switches, maintaining route tables, maintaining client specific information, and handing off mobile clients.

[0078] In an exemplary embodiment, the processor may also control, for example, the attenuation or RF switches on a transmit or receive basis, a per client basis, a fixed period basis, and on a per demand basis.

[0079] Some embodiments may have a network connection that may enable the wireless cell to communicate with a wired network. Some embodiments may have local storage to store, for example, transmit and receive date, relay data, video or audio data, environmental conditions data, and any other type of data required to service clients, function as a network, handoff or receive mobile clients, and forward information.

[0080] When receiving, the MIMO antenna may use, for example, a maximum ratio combiner, an optimal linear combiner, selection diversity, or any combination of these methods or other methods for combining the signals from multiple antennas into a single signal.

[0081] Assume for this example that the communication protocol uses packetized data and that the clients must transmit RTS and await a CTS before transmitting a single packet. It is possible to switch a client, or multiple clients, from a packet based communication protocol to a data stream protocol to increase the efficiency of long data transfers between clients.

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[0082] Another aspect of the invention is the use of multiple directional antennas, at least one radio, at least one attenuator and other electronic devices such as RF switches, packet switches, antenna sharing devices and other electronic and electrical components to generate various embodiments of wireless cells and wireless networks with differing characteristics and capabilities.

[0083] Although there have been described preferred embodiments of this novel invention, many variations and modifications are possible and the embodiments described herein are not limited by the specific disclosure above, but rather should be limited only by the scope of the appended claims.

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CLAIMS

1. A system, comprising:

a single wireless cell configured to operate in a packet-switched cellular network, the single wireless cell including:

a first transmission point with a multiple-input-multiple-output (MIMO) capability, the first transmission point having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second transmission point with a multiple-input-multiple-output (MIMO) capability, the second transmission point having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second transmission point with the multiple-input-multiple-output (MIMO) capability;

said single wireless cell configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability cooperates with the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission;

said single wireless cell configured for:

receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on a measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another measurement

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performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

altering at least one aspect of the first transmission in connection with at least one of: multiple of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

2. The system of Claim 1, wherein the system is configured such that the first directional antennas and the second directional antennas include multiple-input-multiple-output (MIMO) antennas.

3. The system of Claim 1, wherein the system is configured such that the first information is identified by enabling at least one of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, and measuring an ability of the at least one first directional antenna of the first transmission point with the multiple-input-multiple-output (MIMO) capability to communicate with the first multiple-input-multiple-output (MIMO)-capable portable wireless device.

4. The system of Claim 1, wherein the system is configured such that at least one of the first information or the second information is a function of at least one of: a data throughput, a signal-to-noise ratio, a reduced signal error, a reduced data error, a reduced retransmission request, a reduced interference, a rejection of multipath signal, a higher transmission rate, or a signal strength, in connection with the first multiple-input-multiple-output (MIMO)-capable portable wireless device.

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5. The system of Claim 1, wherein the system is configured such that the first transmission point with the multiple-input-multiple-output (MIMO) capability and the second transmission point with the multiple-input-multiple-output (MIMO) capability are capable of communicating with the first multiple-input-multiple-output (MIMO)-capable portable wireless device utilizing the same channel with at least one different channel characteristic.

6. The system of Claim 5, wherein the system is configured such that the at least one different channel characteristic includes at least one of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related, in connection with the same channel.

7. The system of Claim 5, wherein the system is configured such that the at least one different channel characteristic includes at least two of: a channel characteristic related to a throughput-related aspect, a channel characteristic related to a signal-to-noise ratio-related aspect, a channel characteristic related to a signal strength-related aspect, and a channel characteristic related to a multipath signal-related aspect, in connection with the same channel.

8. The system of Claim 5, wherein the system is configured such that the at least one different channel characteristic includes at least three of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, and a channel characteristic that is multipath signal-related, in connection with the same channel.

9. The system of Claim 5, wherein the system is configured such that the at least one different channel characteristic includes at least four of: a channel characteristic related to a throughput-related aspect, a channel characteristic related to a signal-to-noise ratio-related aspect, a channel characteristic related to a signal strength-related aspect, and a channel characteristic related to a multipath signal-related aspect, in connection with the same channel.

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10. The system of Claim 1, wherein the system is configured such that the altering the at least one aspect includes selecting both the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the same data is transmitted in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device via a same channel, utilizing both the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

11. The system of Claim 1, wherein the system is configured such that the altering the at least one aspect includes selecting only one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the data is transmitted in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing only the selected one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

12. The system of Claim 1, wherein the system is configured such that the coordination is performed for selectively directing a beam associated with the first transmission to improve the transmission of the data by overcoming interference.

13. The system of Claim 1, wherein the system is configured such that the altering the at least one aspect includes altering beamforming in connection with at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output

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(MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the data is transmitted in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing the beamforming in connection with the at least one of: the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability.

14. The system of Claim 13, wherein the system is configured such that the beamforming involves weighting and the altering is performed to improve the first transmission independent of a handoff.

15. The system of Claim 1, wherein at least one of:

said first directional antennas are multiple-input-multiple-output (MIMO) antennas;

said second directional antennas are multiple-input-multiple-output (MIMO) antennas;

said first directional antennas and the second directional reduce the effects of noise on transmission and reception;

said first directional antennas exhibit temporal diversity;

said second directional antennas exhibit temporal diversity;

said first transmission point includes a first portion and the second transmission point includes a second portion;

said first transmission point includes a first part and the second transmission point includes a second part;

said first transmission point includes a first group and the second transmission point includes a second group;

said at least one first radio is in communication with the first directional antennas via at least one switch;

said at least one first radio is in communication with the first directional antennas via at least one phased array;

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said at least one first radio includes a single radio that is in communication with the plurality of first directional antennas;

said at least one second radio is in communication with the second directional antennas via at least one switch;

said at least one second radio is in communication with the second directional antennas via at least one phased array;

said at least one second radio includes a single radio that is in communication with the plurality of second directional antennas;

said first circuitry includes at least one controller;

said second circuitry includes at least one controller;

said third circuitry includes at least one processor;

said altering is performed by the third circuitry;

said altering includes selecting both the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability and the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability;

said altering the at least one aspect includes altering the at least one aspect in connection with only the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability;

said transmitting the data in connection with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device includes transmitting the data utilizing the multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability;

said first directional antennas and the second directional antennas have associated therewith a multiple-input-multiple-output (MIMO) virtual sector including an area where a multiple-input-multiple-output (MIMO) physical sector is to operate;

said first directional antennas and the second directional antennas form multiple-input-multiple-output (MIMO) virtual sectors that are capable of being selected to provide multiple-input-multiple-output (MIMO) physical sectors;

said first directional antennas and the second directional antennas are positioned in fixed positions to form multiple-input-multiple-output (MIMO) virtual sectors that are capable of

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being selected to communicate using one or more multiple-input-multiple-output (MIMO) physical sectors associated with the multiple-input-multiple-output (MIMO) virtual sectors;

said multiple first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability include all of the first directional antennas of the first transmission point with the multiple-input-multiple-output (MIMO) capability, the multiple second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability include all of the second directional antennas of the second transmission point with the multiple-input-multiple-output (MIMO) capability; or

said first portable wireless device including at least one of a mobile device, a client, a computer, or a hand-held device.

16. A system, comprising:

a single wireless cell configured to operate in a packet-switched cellular network, the single wireless cell including:

a first portion with a multiple-input-multiple-output (MIMO) capability, the first portion having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second portion with a multiple-input-multiple-output (MIMO) capability, the second portion having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first portion with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second portion with the multiple-input-multiple-output (MIMO) capability;

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said single wireless cell configured such that the first portion with the multiple-input-multiple-output (MIMO) capability cooperates with the second portion with the multiple-input-multiple-output (MIMO) capability to support a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission to address interference, by:

in response to at least one first signal sent by the single wireless cell, receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on an interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

in response to at least one second signal sent by the single wireless cell, receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

performing beamforming to support the first transmission utilizing at least one of: multiple of the first directional antennas of the first portion with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second portion with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data during the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing the beamforming with at least one of: the multiple first directional antennas of the first portion with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second portion with the multiple-input-multiple-output (MIMO) capability.

17. The system of Claim 16, wherein the system is configured such that a channel between the first portion and the first multiple-input-multiple-output (MIMO)-capable portable wireless device differs from another channel between the second portion and the first multiple-input-multiple-output (MIMO)-capable portable wireless device in terms of at least one channel characteristic that includes at least one of: a channel characteristic that is throughput-related, a

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channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related.

18. A system, comprising:

a packet-switched cellular network including a plurality of wireless cells including a particular wireless cell including:

a first group with a multiple-input-multiple-output (MIMO) capability, the first group having:

a plurality of first directional antennas,

at least one first radio in communication with the first directional antennas, and

first circuitry in communication with the at least one first radio;

a second group with a multiple-input-multiple-output (MIMO) capability, the second group having:

a plurality of second directional antennas,

at least one second radio in communication with the second directional antennas, and

second circuitry in communication with the at least one second radio; and

third circuitry in communication with the first circuitry of the first group with the multiple-input-multiple-output (MIMO) capability and the second circuitry of the second group with the multiple-input-multiple-output (MIMO) capability;

said particular wireless cell configured such that the first group with the multiple-input-multiple-output (MIMO) capability cooperates with the second group with the multiple-input-multiple-output (MIMO) capability to support a first transmission to a first multiple-input-multiple-output (MIMO)-capable portable wireless device, for improving the first transmission by addressing interference, by:

receiving first information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on an interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device, and the second group with the multiple-input-multiple-output (MIMO) capability;

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receiving second information from the first multiple-input-multiple-output (MIMO)-capable portable wireless device that is based on another interference-based measurement performed by the first multiple-input-multiple-output (MIMO)-capable portable wireless device;

coordinating utilization of at least one of multiple of the first directional antennas of the first group with the multiple-input-multiple-output (MIMO) capability, or multiple of the second directional antennas of the second group with the multiple-input-multiple-output (MIMO) capability, based on the first information and the second information; and

transmitting data with the first transmission to the first multiple-input-multiple-output (MIMO)-capable portable wireless device, utilizing at least one of: the multiple first directional antennas of the first group with the multiple-input-multiple-output (MIMO) capability, or the multiple second directional antennas of the second group with the multiple-input-multiple-output (MIMO) capability.

19. The system of Claim 18, wherein the system is configured such that a channel between the first group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device differs from another channel between the second group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device in terms of at least one channel characteristic that includes at least one of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related.

20. The system of Claim 18, wherein the system is configured such that a channel between the first group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device differs from another channel between the second group and the first multiple-input-multiple-output (MIMO)-capable portable wireless device in terms of at least two channel characteristics that include at least two of: a channel characteristic that is throughput-related, a channel characteristic that is signal-to-noise ratio-related, a channel characteristic that is signal strength-related, or a channel characteristic that is multipath signal-related.

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ABSTRACT

A system is provided comprising a single wireless cell configured to operate in a packet-switched cellular network, the single wireless cell including: a first transmission point with a multiple-input-multiple-output (MIMO) capability; a second transmission point with a MIMO capability; and third circuitry in communication with first circuitry of the first transmission point and second circuitry of the second transmission point. The single wireless cell is configured such that the first transmission point cooperates with the second transmission point in connection with a first transmission to a MIMO-capable portable wireless device, for improving the first transmission. The single wireless cell is further configured for: receiving first information from the first MIMO-capable portable wireless device; receiving second information from the first MIMO-capable portable wireless device; altering at least one aspect of the first transmission; and transmitting data in connection with the first transmission to the first MIMO-capable portable wireless device.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/476,628 filed on 09/03/2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

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LEGAL NAME OF INVENTOR

Inventor: Roc Lastinger Date (Optional): 09/03/2014

Signature: Roc Lastinger

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/476,628

filed on 09/03/2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Brian C. Woodbury Date (Optional): 09/03/2014

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

Doc code: Oath
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)
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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.

SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	Methods and Apparatus for Overlapping MIMO Physical Sectors

This statement is directed to:

☐ The attached application,

OR

☒ United States application or PCT international application number 14/476,628 filed on 09/03/2014.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

John Spenik

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country

Mailing Address (except for a deceased or legally incapacitated inventor):

City	State	Zip	Country

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

- ☐ Legal Representative (for deceased or legally incapacitated inventor only),
- ☒ Assignee,
- ☐ Person to whom the inventor is under an obligation to assign,
- ☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or
- ☐ Joint Inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

PTO/SB/AIA02 (07-13)
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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- [x] Inventor is deceased,
- [ ] Inventor is under legal incapacity,
- [ ] Inventor cannot be found or reached after diligent effort, or
- [ ] Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- [x] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- [ ] An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Richard Orley	Date (Optional):

Signature:

APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: Helvetia IP AG

Title of Person Executing This Substitute Statement: Trustee

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City Lyss	State Schweiz	Country Switzerland

Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

City	State	Zip	Country

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

Exhibit 1002
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Page 000359

PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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

I hereby appoint:

■ Practitioners associated with Customer Number: 112117

OR

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

Name	Registration Number	Name	Registration Number

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

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

■ The address associated with Customer Number: 112117

OR

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

Assignee Name and Address: Woodbury Wireless LLC, a Texas limited liability company
1003 Rocky Creek Drive, Pflugerville, TX 78660

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

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

Signature	Roc Lastinger	Date	10/6/2015
Name	Roc Lastinger	Telephone	409-283-2811
Title	Managing-Member		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 3 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.

BL

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Woodbury Wireless, LLC

Application No./Patent No.: 14/476,628 Filed/Issue Date: 09/03/2014

Titled: Methods and Apparatus for Overlapping MIMO Physical Sectors

Woodbury Wireless, LLC, a Texas limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

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

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

1. From: ROC LASTINGER, JOHN SPENIK, BRIAN C. WOODBURY To: HELVETIA IP AG

   The document was recorded in the United States Patent and Trademark Office at

   Reel 034201, Frame 0976, or for which a copy thereof is attached.

2. From: HELVETIA IP AG To: Helvetia Wireless, LLC

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(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.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Helvetia Wireless, LLC To: Woodbury Wireless, LLC

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

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

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

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

/Thomas D. Fortenberry/	10/6/2015
Signature	Date
Thomas D. Fortenberry	Reg. No. 56,537
Printed or Typed Name	Title or Registration 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.

Appendix B: Assignment

ASSIGNMENT OF
INVENTIONS AND INTELLECTUAL PROPERTY

This ASSIGNMENT, effective as of July 27, 2015 ("Effective Date"), between Helvetia IP AG (hereinafter referred to as ASSIGNOR), a corporation of Switzerland, with offices at Sonnenhof 3, CH-8808 Pfäffikon SZ and Helvetia Wireless LLC (hereinafter referred to as ASSIGNEE), a Delaware corporation, with offices at 14362 N. Frank Lloyd Wright Boulevard, Suite 2500, Scottsdale, AZ 85260, USA;

WHEREAS, ASSIGNOR has acquired all right, title and interest in and to the patent applications and patents identified in Table 1 below and the inventions and/or improvements disclosed therein;

WHEREAS, ASSIGNEE is desirous of acquiring ASSIGNOR's entire right, title and interest in and to the patent applications and patents identified in Table 1 and the inventions and/or improvements disclosed therein including the rights to damages for infringement committed before the Effective Date of this ASSIGNMENT;

NOW THEREFORE, for and in consideration of the promises and mutual covenants herein contained, the parties hereto agree as follows:

In consideration for the payment of US$ 1.00 and other good and valuable consideration, receipt of which is hereby acknowledged, ASSIGNOR hereby assigns and transfers to ASSIGNEE all right, title and interest worldwide in and to the patent applications and patents identified in Table 1 and the inventions and/or improvements disclosed therein including the rights to damages for infringement committed before the Effective Date of this ASSIGNMENT. This ASSIGNMENT and transfer of right, title and interest includes the rights to file and obtain United States and foreign patents in any country, inventor's certificates and utility models, and all divisions, reissues, substitutions, reexaminations, and continuations thereof, the rights to sue for past and/or present infringement, and the rights to collect damages for past and/or present infringement.

This ASSIGNMENT was negotiated and executed voluntarily and is not the result of duress, fraud, undue influence or threat of any kind. The parties had the opportunity to read and consider this ASSIGNMENT, to consult with counsel, and fully understand this ASSIGNMENT.

Any signatory to this ASSIGNMENT warrants and acknowledges that they are authorized to execute this ASSIGNMENT on behalf of the entity for which they sign.

IN WITNESS WHEREOF, the ASSIGNOR has executed this ASSIGNMENT by signing below.

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000364

Appendix B: Assignment

Helvetia IP AG (ASSIGNOR)

Printed Name: REGINALD CAIN
Signature:
Position: CHAIRMAN OF THE BOARD
Date: 27 July 2015

Helvetia Wireless LLC (ASSIGNEE)

Printed Name: Roc Lastinger ROC LASTINGER
Signature: Roc Lastinger
Position: Manager
Date: 27 July 2015

Table 1: Inventions, Patent Applications, and Patents

	Matter	Title	St.	App. No.	File Date	Pat. No.	Issue Date
1	N017.018	M&A for Overlapping MIMO Antenna Physical Sectors	US	14/476,628	09/03/2014	N/A	N/A

List of Abbreviations:

M&A: An abbreviation for "Method and Apparatus"
M: matter no. prefix "0302."
N: matter no. prefix "1402."
St.: State (e.g., country) of filing or issue
App.: application
Pat.: patent
No.: number

Date format: MM/DD/YYYY

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Nokia v. Woodbury Wireless Inc.
Page 000365

EXHIBIT 1-ASSIGNMENT

WHEREAS, Helvetia Wireless, LLC, having a place of business in Scottsdale, Arizona (hereinafter "ASSIGNOR") is owner of:

Docket	Serial No.	Filing Date	Grant Date	Patent No.	Status
0302.001.010	10/869,201	06/15/2004	11/27/2007	7302278	Granted
0302.002.010	10/880,387	06/29/2004	04/15/2008	7359675	Granted
0302.001.040	11/160,549	06/28/2005	12/11/2007	7308270	Granted
0302.001.041	11/160,550	06/28/2005	0/25/2007	7274944	Granted
0302.001.042	11/160,551	06/28/2005	12/04/2007	7305246	Granted
0302.004.010	11/160,937	07/15/2005	03/25/2008	7349701	Granted
0302.011.010	11/275,605	01/19/2006	03/25/2008	7348930	Granted
0302.012.010	11/275,619	01/19/2006	02/10/2009	7489282	Granted
0302.013.010	11/420,605	05/26/2006	07/15/2008	7400860	Granted
0302.014.010	11/584,730	10/20/2006	09/29/2009	7595756	Granted
0302.016.010	11/586,178	10/25/2006	10/06/2009	7599699	Granted
0302.017.010	11/709,431	02/21/2007	08/30/2011	8009646	Granted
0302.002.042	12/020,932	01/28/2008	09/09/2008	7424298	Granted
0302.004.040	12/021,278	01/28/2008	11/10/2009	7616959	Granted
0302.002.043	12/134,122	06/05/2008	1/18/2011	7873319	Granted
0302.013.040	12/134,959	06/06/2008	10/26/2010	7822386	Granted
0302.017.011	13/118,386	05/28/2011	1/1/2013	8345651	Granted
0302.017.013	13/192,181	07/27/2011	12/4/2012	8325695	Granted
0302.017.014	13/211,529	8/17/2011	02/7/2012	8111678	Granted
0302.017.015	13/218,185	8/25/2011	09/18/2012	8270383	Granted
0302.017.016	13/348,523	01/11/2012	10/7/2014	8855089	Granted
0302.017.017	13/566,986	08/03/2012	04/23/2013	8428039	Granted
0302.013.053	EP 06760642.6	06/01/2006	01/13/2010	1,897,278	Granted
0302.013.055	FR 06760642.6	06/01/2006	01/13/2010	1,897,278	Granted
0302.013.056	UK 06760642.6	06/01/2006	01/13/2010	1,897,278	Granted
0302.013.057	IT 06760642.6	06/01/2006	01/13/2010	1,897,278	Granted
0302.013.058	SE 06760642.6	06/01/2006	01/13/2010	1,897,278	Granted
0302.013.059	DE 06760642.6	06/01/2006	01/13/2010	602006011743.4	Granted
0302.017.053	EP 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted
1402.017.053	DE 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted
1402.017.054	FR 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted
1402.017.055	GB 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted
1402.017.056	HU 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted
1402.017.057	IT 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted
1402.017.058	SE 07751274.7	07/14/2008	12/19/2012	1,994,650	Granted

Docket	Serial No.	Filing Date	Grant Date	Patent No.	Status
1402.017.018	14/476,628	09/03/2014	n/a	n/a	pending
0302.017.055	EP 12155333.3	02/14/2012	n/a	n/a	pending
0302.017.050	CA 2,637,182	02/21/2007	n/a	n/a	pending
1402.017.051	CA 2,867,303	02/21/2007	n/a	n/a	pending
1402.017.052	CA 2,866,948	02/21/2007	n/a	n/a	pending
0302.001.030	60/484,800	07/03/2003	n/a	n/a	converted
0302.002.030	60/493,663	08/08/2003	n/a	n/a	converted
0302.004.030	60/589,088	07/19/2004	n/a	n/a	converted
0302.011.030	60/646,019	01/21/2005	n/a	n/a	converted
0302.012.030	60/646,024	01/21/2005	n/a	n/a	converted
0302.011.031	60/653,447	02/15/2005	n/a	n/a	converted
0302.012.031	60/674,568	04/25/2005	n/a	n/a	converted
0302.013.030	60/692,490	06/21/2005	n/a	n/a	converted
0302.014.030	60/732,107	11/01/2005	n/a	n/a	converted
0302.016.030	60/732,379	11/01/2005	n/a	n/a	converted
0302.017.030	60/743,376	02/28/2006	n/a	n/a	converted
0302.018.030	60/743,897	03/29/2006	n/a	n/a	converted
0302.001.090	PCT/US04/19318	06/16/2004	n/a	n/a	nationalized
0302.002.090	PCT/US04/20940	06/29/2004	n/a	n/a	nationalized
0302.004.090	PCT/US05/25159	07/15/2005	n/a	n/a	nationalized
0302.012.090	PCT/US06/02156	01/20/2006	n/a	n/a	nationalized
0302.011.090	PCT/US06/02482	01/20/2006	n/a	n/a	nationalized
0302.013.090	PCT/US06/21397	06/01/2006	n/a	n/a	nationalized
0302.016.090	PCT/US06/41364	10/24/2006	n/a	n/a	nationalized
0302.017.090	PCT/US07/04504	02/21/2007	n/a	n/a	nationalized
0302.018.090	PCT/US07/07555	03/29/2007	n/a	n/a	nationalized
0302.022.030	61/150662	02/06/2009	n/a	n/a	abandoned
0302.001.044	11/591,391	10/31/2006	n/a	n/a	abandoned
0302.018.010	11/731,002	03/29/2007	n/a	n/a	abandoned
0302.002.040	12/020,767	01/28/2008	n/a	n/a	abandoned
0302.002.041	12/020,857	01/28/2008	n/a	n/a	abandoned
0302.017.012	13/118,406	05/28/2011	n/a	n/a	abandoned
0302.001.050	EP 04755471.2		n/a	n/a	abandoned
0302.002.050	EP 04777274.4		n/a	n/a	abandoned
0302.011.050	CA 2,595,001	07/16/2007	n/a	n/a	abandoned
0302.011.051	MY PI 20071197	07/23/2007	n/a	n/a	abandoned
0302.011.052	KP 10-2007-7016818	07/20/2007	n/a	n/a	abandoned
0302.011.053	EP 06719373.0	08/01/2007	n/a	n/a	abandoned
0302.011.054	CN 200680002642.9		n/a	n/a	abandoned
0302.012.050	CA 2,595,179	07/17/2007	n/a	n/a	abandoned

Docket	Serial No.	Filing Date	Grant Date	Patent No.	Status
0302.012.051	MY PI 20071196	07/23/2007	n/a	n/a	abandoned
0302.012.052	KP 10-2007-7016820	07/20/2007	n/a	n/a	abandoned
0302.012.053	EP 06719120.5.2		n/a	n/a	abandoned
0302.012.054	CN 200680002641.4		n/a	n/a	abandoned
0302.013.050	CA 2,613,243	12/20/2007	n/a	n/a	abandoned
0302.013.052	KP 10-2008-7000731		n/a	n/a	abandoned
0302.013.054	CN 200680027048.5	01/21/2008	n/a	n/a	abandoned
0302.016.050	CA 2,625,364	10/24/2006	n/a	n/a	abandoned
0302.016.051	MY PI 20080973	04/03/2008	n/a	n/a	abandoned
0302.016.052	KP 2008-7010611	04/30/2008	n/a	n/a	abandoned
0302.016.053	EP 06817314.5		n/a	n/a	abandoned
0302.016.054	CN 200680040330.7	04/27/2008	n/a	n/a	abandoned
0302.016.055	HK 09109715.6	10/21/2009	n/a	n/a	abandoned
0302.017.051	MY PI20082737	07/23/2008	n/a	n/a	abandoned
0302.017.052	KP 2008-7021129	08/28/2008	n/a	n/a	abandoned
0302.017.054	CN 200780007128.9	02/21/2008	n/a	n/a	abandoned
0302.017.056	EP 12155339.0	02/14/2012	n/a	n/a	abandoned
0302.017.057	EP 12155343.2	02/14/2012	n/a	n/a	abandoned
0302.017.058	EP 12155348.1	02/14/2012	n/a	n/a	abandoned
0302.017.059	EP 12155356.4	02/14/2012	n/a	n/a	abandoned
0302.017.060	EP 12155357.2	02/14/2012	n/a	n/a	abandoned
0302.018.050	CA 2,637,568	08/15/2008	n/a	n/a	abandoned
0302.018.051	MY PI 20083243	08/22/2008	n/a	n/a	abandoned
0302.018.052	KP 2008-7023519	09/26/2008	n/a	n/a	abandoned
0302.018.053	EP 07754125.8	09/12/2008	n/a	n/a	abandoned
0302.018.054	CN 200780010208.X	09/22/2008	n/a	n/a	abandoned

("Helvetia Assets"),

WHEREAS, Woodbury Wireless, LLC a Texas Limited Liability Company having a place of business in Texas (hereinafter "ASSIGNEE") desires to acquire ASSIGNOR's entire right, title, and interest in and to the Helvetia Assets;

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, ASSIGNOR hereby acknowledges that it has sold, assigned, and transferred, and by these presents does hereby sell, assign, and transfer, unto ASSIGNEE, its successors, legal representatives, and assigns, the entire, irrevocable, and unconditional right, title, and interest of ASSIGNOR in, to, and under the Helvetia Assets, and the inventions disclosed in the Helvetia Assets (regardless of whether claimed) including but not limited to (a) all rights of ASSIGNOR in any and all priority patent application(s), and all foreign and domestic patents that may issue from the Assigned Patent Asset(s) and the aforementioned

priority patent application(s), including reexaminations, reissues, renewals, continuations, continuations-in-part, divisionals, or extensions thereof that have been or may hereafter be filed, and (b) the right to sue for and collect damages for past, present, and future infringements of the Helvetia Assets.

IN TESTIMONY WHEREOF, I hereunto set my hand and seal this 25 day of September, 2015.

Helvetia Wireless, LLC

By: Roc Lastinger

Name: Roc Lastinger

Title: Member

Doc Code: FAI.REQ
Document Description: Request First Action Interview

PTO/SB/413C (05-11)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
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REQUEST FOR FIRST ACTION INTERVIEW (FULL PILOT PROGRAM)

Attorney Docket Number: WBWL001B	Application Number (if known):	Filing date: 2015-11-25
First Named Inventor: Roc Lastinger	Title: Methods and Apparatus for Overlapping MIMO Physical Sectors	

APPLICANT HEREBY REQUESTS A FIRST ACTION INTERVIEW IN THE ABOVE-IDENTIFIED APPLICATION. See Instruction Sheet on page 2.

1. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims.

2. The application must not contain any multiple dependent claims.

3. By filing this request:

   Applicant is agreeing to make an election without traverse if the Office determines that the claims are not obviously directed to a single invention; and

   Applicant is agreeing not to request for a refund of the search fee and any excess claims fee paid in the application after the mailing or notification of the pre-interview communication prepared by the examiner.

4. Other attachments: _____

Signature /Thomas D. Fortenberry/	Date 2015-11-25
Name (Print/Typed) Thomas D. Fortenberry	Registration Number 56,537

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

■ *Total of 1 forms are submitted.

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 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, 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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Instruction Sheet for Request for First Action Interview (Full Pilot Program)

(Not to be Submitted to the USPTO)

A grantable request must meet the following conditions:

1. The application must be a new non-reissue utility application filed under 35 U.S.C. 111(a) or an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).

2. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims. The application may not contain any multiple dependent claims.

3. The request must be filed electronically using the Office's electronic filing system, EFS-Web.

4. The claims must be directed to a single invention. If the Office determines that the claims are directed to multiple inventions (*e.g.*, in a restriction requirement), the applicant must make an election without traverse.

5. The request must be filed at least one day before a first Office action on the merits of the application appears in the Patent Application Information Retrieval (PAIR) system (*i.e.*, at least one day prior to the date when a first Office action on the merits, notice of allowability or allowance, or action under Ex parte Quayle, 1935 Dec. Comm'r Pat. 11 (1935) appears in the PAIR system). Applicant may check the status of the application using the PAIR system.

6. The request for a first action interview must include a statement that applicant agrees not to file a request for a refund of the search fee and any excess claims fees paid in the application after the mailing or notification of the Pre-Interview Communication. Any petition for express abandonment under 37 CFR 1.138(d), and request for a refund of the search fee and any excess claims fees, filed after the mailing or notification of the Pre-Interview Communication will not be granted.

For more information, see notice "Full First Action Interview Pilot Program" available on the USPTO web site at http://www.uspto.gov/patents/init_events/faipp_full.jsp

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Privacy Act Statement

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

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

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

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Page 000372

Doc Code: FAI.REQ
Document Description: Request First Action Interview

PTO/SB/413C (05-11)
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REQUEST FOR FIRST ACTION INTERVIEW (FULL PILOT PROGRAM)

Attorney Docket Number: WBWL001B	Application Number (if known):	Filing date: 2015-11-25
First Named Inventor: Roc Lastinger	Title: Methods and Apparatus for Overlapping MIMO Physical Sectors	

APPLICANT HEREBY REQUESTS A FIRST ACTION INTERVIEW IN THE ABOVE-IDENTIFIED APPLICATION. See Instruction Sheet on page 2.

1. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims.

2. The application must not contain any multiple dependent claims.

3. By filing this request:

   Applicant is agreeing to make an election without traverse if the Office determines that the claims are not obviously directed to a single invention; and

   Applicant is agreeing not to request for a refund of the search fee and any excess claims fee paid in the application after the mailing or notification of the pre-interview communication prepared by the examiner.

4. Other attachments: _____

Signature /Thomas D. Fortenberry/	Date 2015-11-25
Name (Print/Typed) Thomas D. Fortenberry	Registration Number 56,537

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

■ *Total of 1 forms are submitted.

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 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, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Instruction Sheet for Request for First Action Interview (Full Pilot Program)

(Not to be Submitted to the USPTO)

A grantable request must meet the following conditions:

1. The application must be a new non-reissue utility application filed under 35 U.S.C. 111(a) or an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).

2. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims. The application may not contain any multiple dependent claims.

3. The request must be filed electronically using the Office's electronic filing system, EFS-Web.

4. The claims must be directed to a single invention. If the Office determines that the claims are directed to multiple inventions (*e.g.*, in a restriction requirement), the applicant must make an election without traverse.

5. The request must be filed at least one day before a first Office action on the merits of the application appears in the Patent Application Information Retrieval (PAIR) system (*i.e.*, at least one day prior to the date when a first Office action on the merits, notice of allowability or allowance, or action under Ex parte Quayle, 1935 Dec. Comm'r Pat. 11 (1935) appears in the PAIR system). Applicant may check the status of the application using the PAIR system.

6. The request for a first action interview must include a statement that applicant agrees not to file a request for a refund of the search fee and any excess claims fees paid in the application after the mailing or notification of the Pre-Interview Communication. Any petition for express abandonment under 37 CFR 1.138(d), and request for a refund of the search fee and any excess claims fees, filed after the mailing or notification of the Pre-Interview Communication will not be granted.

For more information, see notice "Full First Action Interview Pilot Program" available on the USPTO web site at http://www.uspto.gov/patents/init_events/faipp_full.jsp

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Privacy Act Statement

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

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

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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.

Exhibit 1002
Nokia v. Woodbury Wireless Inc.
Page 000375

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Roc Lastinger	Nonprovisional Application Number (if known):	14952850
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Thomas D. Fortenberry/	Date 2015-11-25
Name (Print/Typed) Thomas D. Fortenberry	Practitioner Registration Number 56,537

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

Electronic Acknowledgement Receipt

EFS ID:	24199978
Application Number:	14952850
International Application Number:	
Confirmation Number:	5881
Title of Invention:	Methods and Apparatus for Overlapping MIMO Physical Sectors
First Named Inventor/Applicant Name:	Roc Lastinger
Customer Number:	112117
Filer:	THOMAS DONALD FORTENBERRY
Filer Authorized By:	
Attorney Docket Number:	WBWL001B
Receipt Date:	25-NOV-2015
Filing Date:	
Time Stamp:	20:51:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	First Action Interview - Enrollment Request	WBWL001B_Interview_Pilot_Program.pdf	621920 841274e7c720b6a396dea4c4e97e8de28f9cf811	no	3

Warnings:	
Information:	

2	TrackOne Request	WBWL001B_Track1.pdf	108827 928801333828009ec9b99f0caa1808de48f2f9be	no	1

Warnings:	
Information:	
Total Files Size (in bytes):	730747

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.

Document code: WFEE

United States Patent and Trademark Office
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