

# **Exhibit 1004**



# UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450  
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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	REQUEST ID
14/996,681	9402190	2462	58259

## PAIR Correspondence Address/Fee Address Change

The following fields have been changed to Customer Number 197 on 02/27/2018 via Private PAIR in view of the certification copied below that authorized the change.

- Maintenance Fee Address

The address for Customer Number 197 is:

197

CPA GLOBAL LIMITED

2318 Mill Road 12th Floor

ALEXANDRIA, VA 22314

**I certify, in accordance with 37 CFR 1.4(d)(4) that I am:**

An attorney or Agent of Record registered to practice before the Patent and Trademark Office who has been given power of attorney in this application

<b>Signature:</b>	/David Trossen/
<b>Name:</b>	David Trossen
<b>Registration Number:</b>	59406



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/996,681	07/26/2016	9402190	CELLP.001C3	4273

20995 7590 07/05/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

## 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):

Hongtao Zhan, Fremont, CA;  
CELLPHONE-MATE, INC., Fremont, CA;

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

# 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)

20995 7590 06/22/2016  
**KNOBBE MARTENS OLSON & BEAR LLP**  
**2040 MAIN STREET**  
**FOURTEENTH FLOOR**  
**IRVINE, CA 92614**

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## 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.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$480	\$480	09/22/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HUYNH, KHOA B	2462	370-497000

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. **KNOBBE MARTENS**  
2. **OLSON & BEAR LLP**  
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)

**CELLPHONE-MATE, INC.**

**FREMONT, CA**

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 **11-1410** (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  
☐ Applicant asserting small entity status. See 37 CFR 1.27  
☐ Applicant changing to regular undiscounted fee status.

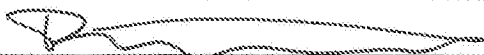
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

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.

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 **June 23, 2016**

Typed or printed name **David Trossen**

Registration No. **59,406**



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	26157706
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Melanie Smuck
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	23-JUN-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	17:53:18
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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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)	IssueFee_CELLP-001C3.pdf	1000609 7bb3e802119ecebdf09a7e78467d8986f60cd03d	no	1

### Warnings:

### Information:

**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**

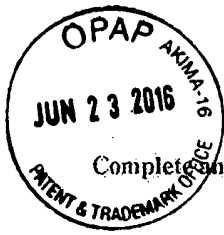
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**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.**



Best Available Copy

TW

## 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)

20995 7590 06/22/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

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.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$480	\$480	09/22/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HUYNH, KHOA B	2462	370-497000

06/24/2016 HVUONG2 00000005 14996681

01 FC:2501

480.00 OP

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.163).

- ☐ 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. KNOBBE MARTENS

2. OLSON &amp; BEAR LLP

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

CELLPHONE-MATE, INC.

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

FREMONT, CA

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 11-1410 (enclose an extra copy of this form).

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- ☐ Applicant certifying micro entity status. See 37 CFR 1.29  
☐ Applicant asserting small entity status. See 37 CFR 1.27  
☐ Applicant changing to regular undiscounted fee status.

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.

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.

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

06/24/2016 HVUONG2  
05/02/2016 INTERSW 00005090 14996681  
01 FC:2501

Typed or printed name

David Trossen

Registration No.

59,406

-480.00 OP



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United States Patent and Trademark Office  
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www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

20995 7590 06/22/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER

HUYNH, KHOA B

ART UNIT

PAPER NUMBER

2462

DATE MAILED: 06/22/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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14/996,681

01/15/2016

Hongtao Zhan

CELLP.001C3

4273

TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$480	\$480	09/22/2016

**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.**

# **PART B - FEE(S) TRANSMITTAL**

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**IRVINE, CA 92614**

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(Depositor's name)
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

**TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS**

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EXAMINER	ART UNIT	CLASS-SUBCLASS
HUYNH, KHOA B	2462	370-497000

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<b>4a. The following fee(s) are submitted:</b> <input type="checkbox"/> Issue Fee <input type="checkbox"/> Publication Fee (No small entity discount permitted) <input type="checkbox"/> Advance Order - # of Copies _____	<b>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</b> <input type="checkbox"/> A check is enclosed. <input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached. <input type="checkbox"/> 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).
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### **5. Change in Entity Status (from status indicated above)**

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
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Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_



# UNITED STATES PATENT AND TRADEMARK OFFICE

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14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

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IRVINE, CA 92614

EXAMINER

HUYNH, KHOA B

ART UNIT PAPER NUMBER

2462

DATE MAILED: 06/22/2016

## 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.

## 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.

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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 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.

<b>Notice of Allowability</b>	<b>Application No.</b> 14/996,681	<b>Applicant(s)</b> ZHAN, HONGTAO	
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462	<b>AIA (First Inventor to File) Status</b> Yes

**-- 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 Communications received on 06/06/2016.  
☐ 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 2-31. 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](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto: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. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Examiner's Amendment/Comment                  |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date <u>05/27/2016; 06/06/2016; 06/08/2016</u> | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material  | 7. <input type="checkbox"/> Other _____.                                  |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____.   |   |

/KHOA HUYNH/  
Primary Examiner, Art Unit 2462




<b>Issue Classification</b> 	<b>Application/Control No.</b> 14996681	<b>Applicant(s)/Patent Under Reexamination</b> ZHAN, HONGTAO	
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462	

CPC						
Symbol					Type	Version
H04W		16		26	F	2013-01-01
H04B		7		15507	I	2013-01-01
H04B		1		40	A	2013-01-01
H04B		7		15542	I	2013-01-01
H04W		52		18	A	2013-01-01
						
						
						
						
						
						
						
						
						
						

CPC Combination Sets					
Symbol		Type	Set	Ranking	Version
					
					

NONE		<b>Total Claims Allowed:</b>	
		30	
(Assistant Examiner)	(Date)		
/KHOA HUYNH/ Primary Examiner.Art Unit 2462	06/13/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1 (Final)	3



<b>Issue Classification</b> 	<b>Application/Control No.</b> 14996681	<b>Applicant(s)/Patent Under Reexamination</b> ZHAN, HONGTAO
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462

<input checked="" type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b> <input type="checkbox"/> <b>CPA</b> <input checked="" type="checkbox"/> <b>T.D.</b> <input type="checkbox"/> <b>R.1.47</b>															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1	16	17												
1	2	17	18												
2	3	18	19												
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10	11	26	27												
11	12	27	28												
12	13	28	29												
13	14	29	30												
14	15	30	31												
15	16														

NONE	<b>Total Claims Allowed:</b> 30	
(Assistant Examiner)	(Date)	
/KHOA HUYNH/ Primary Examiner.Art Unit 2462	06/13/2016	O.G. Print Claim(s) 1 (Final)
(Primary Examiner)	(Date)	O.G. Print Figure 3

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Huynh, Khoa B.
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,095,528	03-10-1992	Leslie et al.	
	2	5,208,563	05-04-1993	Russell et al.	
	3	5,815,795	09-29-1998	Iwai	
	4	6,748,194	06-08-2004	Oh et al.	
	5	7,250,830	07-31-2007	Layne et al.	
	6	7,706,744	04-27-2010	Rodgers et al.	
	7	8,803,635	08-12-2014	Ashworth et al.	
	8	2008/0186106	08-07-2008	Christian et al.	
	9	2011/0261727	10-27-2011	Han	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

23498854  
060816

Examiner Signature	/Khoa Huynh/	Date Considered	06/13/2016
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH EX/KBH/1004

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S250	88	amplificat\$4 path band\$pass filter\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S251	23	pass attenuat\$3 downlink uplink and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S252	18	"band xii" "band xiii" and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S253	2	"band xii" "band xiii" and attenuat\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S254	5060	band\$pass\$3 attenuat\$3 band and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S255	3	band\$pass\$3 attenuat\$3 band near multiple and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S256	31	("5862460"   "20030211828"   "6259682"   "6374119"   "6055431"   "20060003793"   "20060052131"   "20070149146"   "20050215204"   "20070298838"   "20050264466"   "20080310480"   "20060135071").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S257	235	band\$pass\$3 attenuat\$3 band and low	US-PGPUB;	WITH	ON	2016/06/13

		noise power amplif\$5 and (@ad<"20130429" or @rlad<"20130429")	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			01:29
S258	56	band\$pass\$3 uplink downlink and low noise power amplif\$5 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S259	10	"band xii" "band xiii" and "728" and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S260	6	"band xii" "band xiii" and "728" and pass and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S261	4259	band component channel frequency and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S262	258	downlink near channel (subband or sub\$band) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S263	97	downlink near channel (subband or sub\$band) band and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S264	29	"xii" "xiii" and (sub\$band or subband) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S265	5	"xii" "xiii" and (sub\$band or subband) channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	WITH	ON	2016/06/13 01:29

			IBM_TDB			
S266	16	"xii" "xiii" and (sub\$band or subband) and downlink and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S267	824	acoustic wave ceramic filter and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S268	59	acoustic wave ceramic filter band\$pass and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S269	452	amplificat\$4 adjacent adj channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S270	2746	amplif\$5 adjacent adj channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S271	86	amplif\$5 near adjacent adj channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S272	15	amplif\$5 near adjacent adj channels and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S273	3	amplif\$5 near adjacent adj bands and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S274	18	amplif\$5 near adjacent adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO;	WITH	OFF	2016/06/13 01:29

			JPO; DERWENT; IBM_TDB			
S275	18	amplif\$5 near (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S276	19	(amplif\$5 or boost\$4) near (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S277	2	(shared near path) (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S278	31	(shared near path) and (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S279	2472	amplif\$7 same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S280	10	amplif\$7 shared same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S281	16	amplif\$7 near common same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S282	10	amplif\$7 near common same ((multiple) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S283	6	amplif\$7 same multi-band near repeater and (@ad<"20130429" or	US-PGPUB; USPAT;	WITH	OFF	2016/06/13 01:29



		@rlad<"20130429")	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S284	24	(adjacent or abutting or nearby) adj (channels) same different adj bands and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/06/13 01:29
S298	90	("20070071128"   "6570858"   "20080233865"   "9100839"   "7729656"   "8755399"   "8867572"   "20140292593"   "20120302188"   "8760241"   "20050227652"   "7783318"   "5095528"   "5815795"   "6748194"   "7706744"   "5208563"   "7250830"   "8803635"   "20080186106"   "20110261727").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S299	10	S298 and ((shared or common or "same") amplif\$9)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S300	8	((HONGTAO) near2 (ZHAN)).INV.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S301	6	S300 and (band\$pass filter\$4).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S302	8	S300 and (amplif\$9).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S303	5178	370/464,480,481,482,492,497.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S304	15784	375/295,296,297.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S305	2725	455/130,150.1,154.1.ccls.	US-PGPUB; USPAT; USOCR;	WITH	ON	2016/06/13 01:29

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S306	20023	(H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S307	6225	(H04H20/26, H04H40/18).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S308	3081	(H04L27/368, H04L27/368).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S309	38378	(H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S310	194	(S303 or S304 or S305 or S306 or S307 or S308 or S309) and (amplif\$9 (downlink or uplink)) and adjacent (channel or frequency)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S311	522	(S303 or S304 or S305 or S306 or S307 or S308 or S309) and ((shared or common or "same") amplif\$9) and (downlink or uplink)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29
S312	683	(S303 or S304 or S305 or S306 or S307 or S308 or S309) and (amplif\$9 (downlink or uplink)) and band	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/06/13 01:29

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S314	3224	370/464,480,481,482,492,497.ccls.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29

S315	10807	375/295,296,297.ccls.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S316	1643	455/130,150.1,154.1.ccls.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S317	6159	(H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542).cpc.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S318	1707	(H04H20/26, H04H40/18).cpc.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S319	949	(H04L27/368, H04L27/368).cpc.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S320	10660	(H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38).cpc.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S321	3	(S314 or S315 or S316 or S317 or S318 or S319 or S320) and (amplif\$9 and path and downlink and channel and band and simultaneous\$4 and adjacent).clm.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29
S322	3	(amplif\$9 and path and downlink and channel and band and simultaneous\$4 and adjacent).clm.	US-PGPUB; USPAT	WITH	ON	2016/06/13 01:29

6/13/2016 1:33:26 AM  
C:\Users\khuynh2\Desktop\eastworkspaces\14996681c.wsp

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Huynh, Khoa B.
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,095,528	03-10-1992	Leslie et al.	
	2	5,815,795	09-29-1998	Iwai	
	3	6,748,194	06-08-2004	Oh et al.	
	4	7,706,744	04-27-2010	Rodgers et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

23428129  
052716

Examiner Signature	/Khoa Huynh/	Date Considered	06/13/2016
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH EX/KBH/1004

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Huynh, Khoa B.
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	8,755,399	06-17-2014	Van Buren et al.	
	2	8,760,241	06-24-2014	Ashworth et al.	


FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

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Examiner Signature	/Khoa Huynh/	Date Considered	06/13/2016
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH EX/KBH/1004

<b>Search Notes</b>  	<b>Application/Control No.</b>  14996681	<b>Applicant(s)/Patent Under Reexamination</b>  ZHAN, HONGTAO
	<b>Examiner</b>  KHOA HUYNH	<b>Art Unit</b>  2462

CPC- SEARCHED		
Symbol	Date	Examiner
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	06/10/2016 to 06/13/2016	/K.H./
H04H20/26, H04H40/18	06/10/2016 to 06/13/2016	/K.H./
H04L27/368, H04L27/368	06/10/2016 to 06/13/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	06/10/2016 to 06/13/2016	/K.H./

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
370	464,480,481,482,492,497	06/10/2016 to 06/13/2016	/K.H./
375	295,296,297	06/10/2016 to 06/13/2016	/K.H./
455	130,150.1,154.1	06/10/2016 to 06/13/2016	/K.H./

SEARCH NOTES		
Search Notes	Date	Examiner
Double Patent Search (PALM, EAST)	03/08/2016	/K.H./
Text Search: EAST (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TBD)	03/08/2016	/K.H./
NPL Search: Google	03/08/2016	/K.H./
Class Search:		
370/464,480,481,482,492,497	03/08/2016	/K.H./
375/295,296,297	03/08/2016	/K.H./

	/KHOA HUYNH/ Primary Examiner.Art Unit 2462
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## SEARCH NOTES

Search Notes	Date	Examiner
455/130,150.1,154.1	03/08/2016	/K.H./
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	03/08/2016	/K.H./
H04H20/26, H04H40/18	03/08/2016	/K.H./
H04L27/368, H04L27/368	03/08/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	03/08/2016	/K.H./
Update:		
Double Patent Search (PALM, EAST)	04/11/2016 to 04/18/2016	/K.H./
Text Search: EAST (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TBD)	04/11/2016 to 04/18/2016	/K.H./
NPL Search: Google	04/11/2016 to 04/18/2016	/K.H./
Class Search:		
370/464,480,481,482,492,497	04/11/2016 to 04/18/2016	/K.H./
375/295,296,297	04/11/2016 to 04/18/2016	/K.H./
455/130,150.1,154.1	04/11/2016 to 04/18/2016	/K.H./
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	04/11/2016 to 04/18/2016	/K.H./
H04H20/26, H04H40/18	04/11/2016 to 04/18/2016	/K.H./
H04L27/368, H04L27/368	04/11/2016 to 04/18/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	04/11/2016 to 04/18/2016	/K.H./
Update:		
Double Patent Search (PALM, EAST)	06/10/2016 to 06/13/2016	/K.H./
Text Search: EAST (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TBD)	06/10/2016 to 06/13/2016	/K.H./
NPL Search: Google	06/10/2016 to 06/13/2016	/K.H./
Class Search: (With Text)		
370/464,480,481,482,492,497	06/10/2016 to 06/13/2016	/K.H./
375/295,296,297	06/10/2016 to 06/13/2016	/K.H./
455/130,150.1,154.1	06/10/2016 to 06/13/2016	/K.H./
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	06/10/2016 to 06/13/2016	/K.H./
H04H20/26, H04H40/18	06/10/2016 to 06/13/2016	/K.H./
H04L27/368, H04L27/368	06/10/2016 to 06/13/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	06/10/2016 to 06/13/2016	/K.H./

/KHOA HUYNH/  
Primary Examiner.Art Unit 2462

## INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
370	464,480,481,482,492,497	04/11/2016 to 04/18/2016	/K.H./
375	295,296,297	04/11/2016 to 04/18/2016	/K.H./
455	130,150.1,154.1	04/11/2016 to 04/18/2016	/K.H./
H04B	1/26, 1/30, 1/40, 7/15507, 7/15542	04/11/2016 to 04/18/2016	/K.H./
H04H	20/26, 40/18	04/11/2016 to 04/18/2016	/K.H./
H04L	27/368, 27/368	04/11/2016 to 04/18/2016	/K.H./
H04W	16/26, 24/02, 52/04, 52/18, 52/38	04/11/2016 to 04/18/2016	/K.H./
Text Search	EAST (US-PGPUB; USPAT; UPAD)	04/11/2016 to 04/18/2016	/K.H./
Update:			
370	464,480,481,482,492,497	06/10/2016 to 06/13/2016	/K.H./
375	295,296,297	06/10/2016 to 06/13/2016	/K.H./
455	130,150.1,154.1	06/10/2016 to 06/13/2016	/K.H./
H04B	1/26, 1/30, 1/40, 7/15507, 7/15542	06/10/2016 to 06/13/2016	/K.H./
H04H	20/26, 40/18	06/10/2016 to 06/13/2016	/K.H./
H04L	27/368, 27/368	06/10/2016 to 06/13/2016	/K.H./
H04W	16/26, 24/02, 52/04, 52/18, 52/38	06/10/2016 to 06/13/2016	/K.H./
Text Search	EAST (US-PGPUB; USPAT; UPAD)	06/10/2016 to 06/13/2016	/K.H./

/KHOA HUYNH/  
Primary Examiner.Art Unit 2462



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Huynh, Khoa B.
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,095,528	03-10-1992	Leslie et al.	
	2	5,208,563	05-04-1993	Russell et al.	
	3	5,815,795	09-29-1998	Iwai	
	4	6,748,194	06-08-2004	Oh et al.	
	5	7,250,830	07-31-2007	Layne et al.	
	6	7,706,744	04-27-2010	Rodgers et al.	
	7	8,803,635	08-12-2014	Ashworth et al.	
	8	2008/0186106	08-07-2008	Christian et al.	
	9	2011/0261727	10-27-2011	Han	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

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Examiner Signature	Date Considered
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T<sup>1</sup> - Place page number in this area when an English language Translation is attached. **Wilson Exhibit 1004**

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	26004554
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Alanna Wai
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	08-JUN-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	14:41:06
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS_CELLP-001C3.pdf	42958 a66c1f62631ed903789ce3cae3f94654e472af69	yes	3

	<b>Multipart Description/PDF files in .zip description</b>		
	<b>Document Description</b>	<b>Start</b>	<b>End</b>
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3
<b>Warnings:</b>			
<b>Information:</b>			
<b>Total Files Size (in bytes):</b>		42958	
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>			

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**INFORMATION DISCLOSURE STATEMENT**

Inventor	: Hongtao Zhan
App. No.	: 14/996,681
Filed	: January 15, 2016
For	: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	: Huynh, Khoa B.
Art Unit	: 2462
Conf. No.	: 4273

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

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed before the receipt of a First Office Action on the merits after the filing of a request for continued examination, and presumably no fee is required. If a First Office Action on the merits was mailed before the mailing date of this Statement, the Commissioner is authorized to charge the fee set forth in 37 CFR 1.17(p) to Deposit Account No. 11-1410.

**Application No.: 14/996,681**  
**Filing Date: January 15, 2016**

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: June 8, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

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060816

## PATENT WITHDRAWAL NOTICE

DATE WITHDRAWN

6/7/2016

WITHDRAWAL NUMBER

33415

The following application has been **WITHDRAWN** from the  
**6/7/2016** issue.

SERIAL NO.

14996681

PATENT NUMBER

9363682

TITLE

APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

NAME AND ADDRESS

HONGTAO ZHAN  
Fremont, CA

REASON FOR WITHDRAWAL

Auto-petition to withdraw - Granted

APPROVED

/Kimberly Terrell/, Manager

Patent Publication Branch  
Office of Data Management

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

Application Number	14996681	Filing Date	2016-01-15	Docket Number (if applicable)	CELLP.001C3	Art Unit	2462
First Named Inventor	Hongtao Zhan			Examiner Name	Khoa B. Huynh		

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**

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

### SUBMISSION REQUIRED UNDER 37 CFR 1.114

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

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

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

☐ Other \_\_\_\_\_

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other \_\_\_\_\_

### MISCELLANEOUS

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

☐ Other \_\_\_\_\_

### FEES

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

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to  
Deposit Account No 111410

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	David Trossen/	Date (YYYY-MM-DD)	2016-06-06
Name	David Trossen	Registration Number	59406

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

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



## Privacy Act Statement

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

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

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

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**INFORMATION DISCLOSURE STATEMENT**

Inventor	: Hongtao Zhan
App. No.	: 14/996,681
Filed	: January 15, 2016
For	: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	: Huynh, Khoa B.
Art Unit	: 2462
Conf. No.	: 4273

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

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed with an RCE, and no fee is believed to be required.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: June 6, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

23479038  
060616

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Huynh, Khoa B.
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	8,755,399	06-17-2014	Van Buren et al.	
	2	8,760,241	06-24-2014	Ashworth et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

23478994  
060616

Examiner Signature	Date Considered
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T<sup>1</sup> - Place in this area when an English language Translation is attached. **Wilson Exhibit 1004**

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web		PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	<b>PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)</b>	
Application Number	14996681	
Filing Date	15-Jan-2016	
First Named Inventor	Hongtao Zhan	
Art Unit	2462	
Examiner Name	KHOA HUYNH	
Attorney Docket Number	CELLP.001C3	
Title	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS	
<p>An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.</p> <p>APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).</p> <p>A grantable petition requires the following items:</p> <p>(1) Petition fee; and</p> <p>(2) One of the following reasons:</p> <p>(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;</p> <p>(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or</p> <p>(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).</p>		
Petition Fee		
<input checked="" type="radio"/> Small Entity		
<input type="radio"/> Micro Entity		
<input type="radio"/> Regular Undiscounted		
Reason for withdrawal from issue		

- ☐ One or more claims are unpatentable
- ☒ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees)
- ☐ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).

RCE request, submission, and fee.

- ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that :
- ☐ The RCE request ,submission, and fee have already been filed in the above-identified application on
- ☒ Are attached.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

- ☒ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application.
- ☐ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity.
- ☐ A sole inventor
- ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application
- ☐ A joint inventor; all of whom are signing this e-petition

Signature	/David Trossen/
Name	David Trossen
Registration Number	59406

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	14996681			
<b>Filing Date:</b>	15-Jan-2016			
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS			
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan			
<b>Filer:</b>	David R. Trossen/Sandra Autry			
<b>Attorney Docket Number:</b>	CELLP.001C3			
Filed as Small Entity				
<b>Filing Fees for    Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
Petition Fee-37CFR 1.17(h) (Group II)	2464	1	70	70
Request for Continued Examination	2801	1	600	600
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				670





## UNITED STATES PATENT AND TRADEMARK OFFICE

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Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

Decision Date : June 6, 2016

In re Application of :

Hongtao Zhan

DECISION ON PETITION

UNDER CFR 1.313(c)(2)

Application No : 14996681

Filed : 15-Jan-2016

Attorney Docket No : CELLP.001C3

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed June 6, 2016 , to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

**Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.**

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2462 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	25982436
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Sandra Autry
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	06-JUN-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	19:09:48
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 670
RAM confirmation Number	5738
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

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

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	RCE_CELLP-001C3.pdf	1350104	no	3
			1a1e573d44b0292a9a3dd7faac52884dcf26029f		
Warnings:					
Information:					
2		IDS_CELLP-001C3.pdf	40864	yes	3
			31553f20d03bfd9e1f9d1e62a7a7f7e3a352f94e		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	3	
Warnings:					
Information:					
3	Petition automatically granted by EFS	petition-request.pdf	31703	no	2
			e82b0b860c0c2b8dc19cfcbc34044bfc9af33698		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32673	no	2
			ff4d8c8708db293ffdfc976c6c62337e55e6186		
Warnings:					
Information:					
Total Files Size (in bytes):			1455344		

**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.**

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Huynh, Khoa B.
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	5,095,528	03-10-1992	Leslie et al.	
	2	5,815,795	09-29-1998	Iwai	
	3	6,748,194	06-08-2004	Oh et al.	
	4	7,706,744	04-27-2010	Rodgers et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

23428129  
052716

Examiner Signature	Date Considered
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T<sup>1</sup> - Place in this area when an English language Translation is attached. **Wilson Exhibit 1004**

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	25914464
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Alanna Wai
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	27-MAY-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	20:22:00
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS_CELLP-001C3.pdf	41006 3cedf920beabbc08a82ad890602f17ad072b29d1	yes	3

	<b>Multipart Description/PDF files in .zip description</b>		
	<b>Document Description</b>	<b>Start</b>	<b>End</b>
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3
<b>Warnings:</b>			
<b>Information:</b>			
<b>Total Files Size (in bytes):</b>		41006	
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>			

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**INFORMATION DISCLOSURE STATEMENT**

Inventor	: Hongtao Zhan
App. No.	: 14/996,681
Filed	: January 15, 2016
For	: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	: Huynh, Khoa B.
Art Unit	: 2462
Conf. No.	: 4273

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

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed after the mailing date of a Notice of Allowance. Please place these references in the file in accordance with 37 CFR 1.97(i).



**Application No.: 14/996,681**  
**Filing Date: January 15, 2016**

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: May 27, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

23428142  
052716



# 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](http://www.uspto.gov)

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/996,681	06/07/2016	9363682	CELLP.001C3	4273

20995 7590 05/18/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

## 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):

Hongtao Zhan, Fremont, CA;  
CELLPHONE-MATE, INC., Fremont, CA;

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



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
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3

CONFIRMATION NO. 4273

PUBLICATION NOTICE



\*OC000000082861095\*

20995  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

**Title:** APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

**Publication No.** US-2016-0135059-A1

**Publication Date:** 05/12/2016

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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

# 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)

20995 7590 04/28/2016  
**KNOBBE MARTENS OLSON & BEAR LLP**  
**2040 MAIN STREET**  
**FOURTEENTH FLOOR**  
**IRVINE, CA 92614**

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.
14/096,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

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	07/28/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HUYNH, KHOA B	2462	370-497000

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 KNOBBE MARTENS  
2 OLSON & BEAR LLP  
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 3.111. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

**CELLPHONE-MATE, INC.**

**FREMONT, CA**

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 11-1410 (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  
☐ Applicant asserting small entity status. See 37 CFR 1.27  
☐ Applicant changing to regular undiscounted fee status.

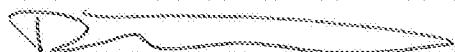
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

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.

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

4/29/2016

Typed or printed name

David Trossen

Registration No.

59,406

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Inventor	:	Hongtao Zhan
App. No.	:	14/996,681
Filed	:	January 15, 2016
For	:	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	:	Huynh, Khoa B
Art Unit	:	2462
Conf. No.	:	4273

**COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE****Mail Stop Issue Fee**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

Applicant appreciates the finding of the pending claims to be allowable. In the Notice of Allowance dated April 28, 2016, the Examiner indicates on pages 2-3 reasons for allowance of the claims.

Applicant assumes that, pursuant to M.P.E.P. § 1302.14, the Examiner has stated some, but not all of the reasons for allowance of the claims. As a result, the statements noted above do not necessarily relate to or completely set out all the reasons for allowance of each and every claim. Furthermore, the patentability of the dependent claims does not solely depend upon the patentability of their respective base claims. Rather, each dependent claim recites further distinguishing features of particular utility.

**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

Applicant respectfully notes that patentability of each claim is derived from the claim as a whole and the reasons for allowance are not limited to the features explicitly discussed by the Examiner.

Furthermore, Applicant does not necessarily agree with the Examiner's characterization of the prior art.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: April 29, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

23225786  
042916

Electronic Patent Application Fee Transmittal				
Application Number:		14996681		
Filing Date:		15-Jan-2016		
Title of Invention:		APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		
First Named Inventor/Applicant Name:		Hongtao Zhan		
Filer:		David R. Trossen/Alanna Wai		
Attorney Docket Number:		CELLP.001C3		
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

<b>EFS ID:</b>	25643503
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Heide Young
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	29-APR-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	17:30:15
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 480
RAM confirmation Number	5090
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

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

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	IssueFee_CELLP-001C3.pdf	970160	no	1
			ba16fdba30abdf318736c82a9bb9dbb3081de91f		
<b>Warnings:</b>					
<b>Information:</b>					
2	Post Allowance Communication - Incoming	Comments_CELLP-001C3.pdf	19583	no	2
			c0dfa015505a7c0e65cf9a3372c5c9dcc54ca26		
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	30945	no	2
			4fcaa8731da36d876179a10c138f779a4c3e5ca6		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1020688		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					



# UNITED STATES PATENT AND TRADEMARK OFFICE

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

## NOTICE OF ALLOWANCE AND FEE(S) DUE

20995 7590 04/28/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER

HUYNH, KHOA B

ART UNIT

PAPER NUMBER

2462

DATE MAILED: 04/28/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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14/996,681

01/15/2016

Hongtao Zhan

CELLP.001C3

4273

TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional

SMALL

\$480

\$0

\$0

\$480

07/28/2016

**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.**

# **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)

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.

20995 7590 04/28/2016  
**KNOBBE MARTENS OLSON & BEAR LLP**  
**2040 MAIN STREET**  
**FOURTEENTH FLOOR**  
**IRVINE, CA 92614**

## **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.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

**TITLE OF INVENTION: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS**

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	07/28/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HUYNH, KHOA B	2462	370-497000

<b>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</b> <input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. <input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b>	<b>2. For printing on the patent front page, list</b> (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____ (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. 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

<b>4a. The following fee(s) are submitted:</b> <input type="checkbox"/> Issue Fee <input type="checkbox"/> Publication Fee (No small entity discount permitted) <input type="checkbox"/> Advance Order - # of Copies _____	<b>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</b> <input type="checkbox"/> A check is enclosed. <input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached. <input type="checkbox"/> 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
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

**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.

**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.

**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. \_\_\_\_\_



# 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.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

20995 7590 04/28/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER

HUYNH, KHOA B

ART UNIT PAPER NUMBER

2462

DATE MAILED: 04/28/2016

## 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.

## 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.

<b>Notice of Allowability</b>	<b>Application No.</b> 14/996,681	<b>Applicant(s)</b> ZHAN, HONGTAO	
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462	<b>AIA (First Inventor to File) Status</b> Yes

**-- 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 Communications received on 03/22/2016.  
☐ 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 2-31. 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](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto: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. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Examiner's Amendment/Comment                             |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 7. <input type="checkbox"/> Other _____.   |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____.                     |  |

/KHOA HUYNH/  
Primary Examiner, Art Unit 2462

Art Unit: 2462

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

### **EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE**

1. This Office Action is in response to the Applicants' communications received on 03/22/2016.

### **Claim Status**

2. Claims 2-31 are currently presenting for examination.
3. Claims 2-31 are ALLOWED.

### ***Allowable Subject Matter***

5. Claims 2-31 are allowed.
6. The following is an examiner's statement of reasons for allowance:
7. As per claims 2-31 generally, none of the prior art references of record, including, but not limited to: Sahota, US 2012/0302188; Malarky, US 2008/0233865; Kang, US 2005/0227652 as well as the other references; anticipate, disclose, teach or suggest, alone, or in combination, at the time of the invention, the features as discussed and remarked upon [in the prosecution of the current patent application and its parent U.S. patent 9,100,839] of the inventions as set forth in the claims in this application as allowed, and not necessarily as summarized and/or characterized by the examiner, whether or not as italicized, in the Examiner's Statement of Reasons for Allowance.
8. Specifically, (as per claim 1 for example) prior art dealing with providing amplification for multiple bands is generally known to exist per se, (Sahota, fig 2, paragraph 24-26, 40, table 1).

Nowhere in the prior art is found collectively the italicized claim elements (for example in claim 1):  
*"wherein the shared amplification path is further configured to simultaneously boost both the at least a portion of the first downlink channel and the at least a portion of the second downlink channel, wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another"*, at the time of the invention, serving to patentably distinguish the invention from said prior art.



Art Unit: 2462

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

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHOA HUYNH whose telephone number is (571)270-7185. The examiner can normally be reached on Monday - Friday 9:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, YEMANE MESFIN can be reached on 571-272-3927. 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.

/KHOA HUYNH/  
Primary Examiner, Art Unit 2462

<b>Notice of References Cited</b>	Application/Control No. 14/996,681		Applicant(s)/Patent Under Reexamination ZHAN, HONGTAO	
	Examiner KHOA HUYNH		Art Unit 2462	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-2012/0302188 A1	11-2012	Sahota; Gurkanwal Singh	H04B1/006	455/150.1
*	B	US-2008/0233865 A1	09-2008	Malarky; Alastair	H04B7/18515	455/12.1
*	C	US-2005/0227652 A1	10-2005	Kang, Dong Kyun	H04B1/28	455/194.2
	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.

<b>Search Notes</b>  	<b>Application/Control No.</b>  14996681	<b>Applicant(s)/Patent Under Reexamination</b>  ZHAN, HONGTAO
	<b>Examiner</b>  KHOA HUYNH	<b>Art Unit</b>  2462

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Double Patent Search (PALM, EAST)	03/08/2016	/K.H./
Text Search: EAST (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM TBD)	03/08/2016	/K.H./
NPL Search: Google	03/08/2016	/K.H./
Class Search:		
370/464,480,481,482,492,497	03/08/2016	/K.H./
375/295,296,297	03/08/2016	/K.H./
455/130,150.1,154.1	03/08/2016	/K.H./
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	03/08/2016	/K.H./
H04H20/26, H04H40/18	03/08/2016	/K.H./
H04L27/368, H04L27/368	03/08/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	03/08/2016	/K.H./
Update:		
Double Patent Search (PALM, EAST)	04/11/2016 to 04/18/2016	/K.H./
Text Search: EAST (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM TBD)	04/11/2016 to 04/18/2016	/K.H./
NPL Search: Google	04/11/2016 to 04/18/2016	/K.H./
Class Search:		

	/KHOA HUYNH/ Primary Examiner.Art Unit 2462
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## SEARCH NOTES

Search Notes	Date	Examiner
370/464,480,481,482,492,497	04/11/2016 to 04/18/2016	/K.H./
375/295,296,297	04/11/2016 to 04/18/2016	/K.H./
455/130,150.1,154.1	04/11/2016 to 04/18/2016	/K.H./
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	04/11/2016 to 04/18/2016	/K.H./
H04H20/26, H04H40/18	04/11/2016 to 04/18/2016	/K.H./
H04L27/368, H04L27/368	04/11/2016 to 04/18/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	04/11/2016 to 04/18/2016	/K.H./

## INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
370	464,480,481,482,492,497	04/11/2016 to 04/18/2016	/K.H./
375	295,296,297	04/11/2016 to 04/18/2016	/K.H./
455	130,150.1,154.1	04/11/2016 to 04/18/2016	/K.H./
H04B	1/26, 1/30, 1/40, 7/15507, 7/15542	04/11/2016 to 04/18/2016	/K.H./
H04H	20/26, 40/18	04/11/2016 to 04/18/2016	/K.H./
H04L	27/368, 27/368	04/11/2016 to 04/18/2016	/K.H./
H04W	16/26, 24/02, 52/04, 52/18, 52/38	04/11/2016 to 04/18/2016	/K.H./
Text Search	EAST (US-PGPUB; USPAT; UPAD)	04/11/2016 to 04/18/2016	/K.H./

/KHOA HUYNH/  
Primary Examiner.Art Unit 2462

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S176	88	amplificat\$4 path band\$pass filter\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S177	23	pass attenuat\$3 downlink uplink and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S178	17	"band xii" "band xiii" and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S179	2	"band xii" "band xiii" and attenuat\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S180	5016	band\$pass\$3 attenuat\$3 band and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S181	3	band\$pass\$3 attenuat\$3 band near multiple and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S182	31	("5862460"   "20030211828"   "6259682"   "6374119"   "6055431"   "20060003793"   "20060052131"   "20070149146"   "20050215204"   "20070298838"   "20050264466"   "20080310480"   "20060135071").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S183	234	band\$pass\$3 attenuat\$3 band and low	US-PGPUB;	WITH	ON	2016/04/18

		noise power amplif\$5 and (@ad<"20130429" or @rlad<"20130429")	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			12:01
S184	56	band\$pass\$3 uplink downlink and low noise power amplif\$5 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S185	10	"band xii" "band xiii" and "728" and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S186	6	"band xii" "band xiii" and "728" and pass and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S187	4213	band component channel frequency and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S188	256	downlink near channel (subband or sub\$band) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S189	96	downlink near channel (subband or sub\$band) band and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S190	29	"xii" "xiii" and (sub\$band or subband) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S191	5	"xii" "xiii" and (sub\$band or subband) channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	WITH	ON	2016/04/18 12:01

			IBM_TDB			
S192	16	"xii" "xiii" and (sub\$band or subband) and downlink and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S193	822	acoustic wave ceramic filter and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S194	59	acoustic wave ceramic filter band\$pass and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S195	451	amplificat\$4 adjacent adj channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S196	2732	amplif\$5 adjacent adj channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S197	85	amplif\$5 near adjacent adj channel and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S198	15	amplif\$5 near adjacent adj channels and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S199	3	amplif\$5 near adjacent adj bands and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S200	18	amplif\$5 near adjacent adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO;	WITH	OFF	2016/04/18 12:01

			JPO; DERWENT; IBM_TDB			
S201	18	amplif\$5 near (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S202	19	(amplif\$5 or boost\$4) near (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S203	2	(shared near path) (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S204	30	(shared near path) and (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S205	2443	amplif\$7 same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S206	10	amplif\$7 shared same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S207	16	amplif\$7 near common same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S208	10	amplif\$7 near common same ((multiple) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S209	6	amplif\$7 same multi-band near repeater and (@ad<"20130429" or	US-PGPUB; USPAT;	WITH	OFF	2016/04/18 12:01



		@rlad<"20130429")	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S210	23	(adjacent or abutting or nearby) adj (channels) same different adj bands and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/04/18 12:01
S211	6	((HONGTAO) near2 (ZHAN)).INV.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S212	4	S211 and (band\$pass filter\$4).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S213	6	S211 and (amplif\$9).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S214	5174	370/464,480,481,482,492,497.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S215	15711	375/295,296,297.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S216	2724	455/130,150.1,154.1.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S217	19773	(H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S218	6208	(H04H20/26, H04H40/18).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	WITH	ON	2016/04/18 12:01


			DERWENT; IBM_TDB			
S219	3014	(H04L27/368, H04L27/368).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S220	37498	(H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S221	177	(S214 or S215 or S216 or S217 or S218 or S219 or S220) and (amplif\$9 (downlink or uplink)) and adjacent (channel or frequency)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S222	506	(S214 or S215 or S216 or S217 or S218 or S219 or S220) and ((shared or common or "same") amplif\$9) and (downlink or uplink)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01
S223	645	(S214 or S215 or S216 or S217 or S218 or S219 or S220) and (amplif\$9 (downlink or uplink)) and band	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/04/18 12:01































EAST Search History (Interference)





Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S224	3224	370/464,480,481,482,492,497.ccls.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S225	10767	375/295,296,297.ccls.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S226	1642	455/130,150.1,154.1.ccls.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S227	6023	(H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542).cpc.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S228	1695	(H04H20/26, H04H40/18).cpc.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S229	934	(H04L27/368, H04L27/368).cpc.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01

S230	10181	(H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38).opc.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S231	1	(S224 or S225 or S226 or S227 or S228 or S229 or S230) and (amplif\$9 and path and downlink and channel and band and simultaneous\$4 and adjacent).clm.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01
S232	1	(amplif\$9 and path and downlink and channel and band and simultaneous\$4 and adjacent).clm.	US-PGPUB; USPAT	WITH	ON	2016/04/18 12:01

4/ 18/ 2016 12:08:03 PM  
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<b>Issue Classification</b> 	<b>Application/Control No.</b> 14996681	<b>Applicant(s)/Patent Under Reexamination</b> ZHAN, HONGTAO	
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462	

CPC						
Symbol					Type	Version
H04W		16		26	F	2013-01-01
H04B		7		15507	I	2013-01-01
H04B		1		40	A	2013-01-01
H04W		52		18	A	2013-01-01
H04B		7		15542	I	2013-01-01
						
						
						
						
						
						
						
						
						
						

CPC Combination Sets					
Symbol		Type	Set	Ranking	Version
					
					

NONE		<b>Total Claims Allowed:</b> 30	
(Assistant Examiner)	(Date)		
/KHOA HUYNH/ Primary Examiner.Art Unit 2462	04/18/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1 (Final)	3



<b>Issue Classification</b> 	<b>Application/Control No.</b> 14996681	<b>Applicant(s)/Patent Under Reexamination</b> ZHAN, HONGTAO
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462

<input checked="" type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b> <input type="checkbox"/> <b>CPA</b> <input checked="" type="checkbox"/> <b>T.D.</b> <input type="checkbox"/> <b>R.1.47</b>															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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1	2	17	18												
2	3	18	19												
3	4	19	20												
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13	14	29	30												
14	15	30	31												
15	16														

NONE	<b>Total Claims Allowed:</b> 30	
(Assistant Examiner)	(Date)	
/KHOA HUYNH/ Primary Examiner.Art Unit 2462	04/18/2016	O.G. Print Claim(s) 1 (Final)
(Primary Examiner)	(Date)	O.G. Print Figure 3

<b>Doc Code: DIST.E.FILE</b> <b>Document Description: Electronic Terminal Disclaimer - Filed</b>		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce	
Electronic Petition Request	<b>TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT</b>		
Application Number	14996681		
Filing Date	15-Jan-2016		
First Named Inventor	Hongtao Zhan		
Attorney Docket Number	CELLP.001C3		
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		
<input checked="" type="checkbox"/> Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action  <input checked="" type="checkbox"/> This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.			
Owner		Percent Interest	
Cellphone-Mate, Inc.		100%	
<p>The owner(s) with 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 prior patent number(s)</p> <p>9100839</p> <p>as the term of said prior patent is presently shortened by any terminal disclaimer. 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 the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.</p> <p>In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:</p> <ul style="list-style-type: none"> <li>- expires for failure to pay a maintenance fee;</li> <li>- is held unenforceable;</li> <li>- is found invalid by a court of competent jurisdiction;</li> <li>- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;</li> <li>- has all claims canceled by a reexamination certificate;</li> <li>- is reissued; or</li> <li>- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.</li> </ul> <p><input checked="" type="radio"/> Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.</p>			

<input type="radio"/> 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:  <input checked="" type="radio"/> Small Entity  <input type="radio"/> Micro Entity  <input type="radio"/> 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:  <input checked="" type="radio"/> An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application  Registration Number <u>59406</u>  <input type="radio"/> A sole inventor  <input type="radio"/> 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  <input type="radio"/> A joint inventor; all of whom are signing this request	
Signature	/David Trossen/
Name	David Trossen

\*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

<b>Application Number:</b>	14996681			
<b>Filing Date:</b>	15-Jan-2016			
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS			
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan			
<b>Filer:</b>	David R. Trossen/Tony Do			
<b>Attorney Docket Number:</b>	CELLP.001C3			
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
Statutory or Terminal Disclaimer	2814	1	160	160
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				

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.: 14996681

Filing Date: 15-Jan-2016

Applicant/Patent under Reexamination: Zhan et al.

Electronic Terminal Disclaimer filed on March 22, 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

<b>EFS ID:</b>	25273168
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Tony Do
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	22-MAR-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	17:14:48
<b>Application Type:</b>	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	4143
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

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

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

<b>File Listing:</b>					
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	33508	no	2
			d79e1cee7eac1bc45d314df7b39a0978ffa8f2c5		
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	30718	no	2
			a78a54cde830d0fe8764ff656c1abaa4e6cc15cf		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			64226		
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  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.</p>					

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor	:	Hongtao Zhan
App. No.	:	14/996,681
Filed	:	January 15, 2016
For	:	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	:	Huynh, Khoa B.
Art Unit	:	2462
Conf. No.	:	4273

**RESPONSE TO NON-FINAL OFFICE ACTION****Mail Stop Amendment**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action dated March 15, 2016, please consider the following items:

**A Listing of the Claims** begins on page 2 of this paper.

**Remarks** begin on page 8 of this paper.

**LISTING OF THE CLAIMS**

1. (Canceled)
2. (Previously Presented) A radio frequency signal booster comprising:
  - a printed circuit board (PCB) comprising:
    - a shared amplification path configured to provide amplification to at least a portion of a first downlink channel of a first frequency band and to provide amplification to at least a portion of a second downlink channel of a second frequency band, wherein the first frequency band and the second frequency band are different frequency bands,
    - wherein the shared amplification path comprises a first band-pass filter configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel, wherein the shared amplification path is further configured to simultaneously boost both the at least a portion of the first downlink channel and the at least a portion of the second downlink channel,
    - wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another,
    - wherein the shared amplification path further comprises at least one amplifier.
3. (Previously Presented) The radio frequency signal booster of claim 2, wherein the first band-pass filter is further configured to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band.
4. (Previously Presented) The radio frequency signal booster of claim 2, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

5. (Previously Presented) The radio frequency signal booster of claim 4,  
wherein the first band-pass filter is further configured to pass at least a portion of  
a Band XII downlink channel having a frequency range of about 728 MHz to about 746  
MHz,

wherein the first band-pass filter is further configured to attenuate a Band XII  
uplink channel having a frequency range of about 698 MHz to about 716 MHz,

wherein the first band-pass filter is further configured to pass at least a portion of  
a Band XIII downlink channel having a frequency range of about 746 MHz to about 757  
MHz,

wherein the first band-pass filter is further configured to attenuate a Band XIII  
uplink channel having a frequency range of about 776 MHz to about 787 MHz.

6. (Previously Presented) The radio frequency signal booster of claim 2, wherein the first  
frequency band comprises a first plurality of sub-bands, wherein the second frequency band  
comprises a second plurality of sub-bands, wherein the at least a portion of the first downlink  
channel comprises at least one sub-band of the first plurality of sub-bands, and wherein the at  
least a portion of the second downlink channel comprises at least one sub-band of the second  
plurality of sub-bands.

7. (Previously Presented) The radio frequency signal booster of claim 2, wherein the first  
downlink channel of the first frequency band and the second downlink channel of the second  
frequency band are abutting in frequency.

8. (Previously Presented) The radio frequency signal booster of claim 2, wherein the first  
band-pass filter comprises one of a surface acoustic wave filter or a ceramic filter.

9. (Previously Presented) The radio frequency signal booster of claim 2,  
wherein the shared amplification path further comprises one or more additional  
band-pass filters, wherein each of the one or more additional band-pass filters are



configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel.

10. (Previously Presented) The radio frequency signal booster of claim 2, wherein the at least one amplifier of the shared amplification path comprises a low noise amplifier (LNA).

11. (Previously Presented) The radio frequency signal booster of claim 2, wherein the at least one amplifier of the shared amplification path comprises a power amplifier (PA).

12. (Previously Presented) The radio frequency signal booster of claim 2, wherein the at least one amplifier of the shared amplification path comprises a gain block.

13. (Previously Presented) The radio frequency signal booster of claim 2, wherein the shared amplification path further comprises at least one digital attenuator.

14. (Previously Presented) The radio frequency signal booster of claim 2, wherein the shared amplification path further comprises at least one analog attenuator.

15. (Previously Presented) The radio frequency signal booster of claim 2, further comprising a multiplexer comprising the first band-pass filter.

16. (Previously Presented) The radio frequency signal booster of claim 15, wherein the multiplexer multiplexes two frequency bands.

17. (Previously Presented) The radio frequency signal booster of claim 2, further comprising a housing and one or more components, wherein the housing houses the PCB and the one or more components.

18. (Previously Presented) The radio frequency signal booster of claim 2, wherein a gain of the shared amplification path is externally controllable.

19. (Previously Presented) The radio frequency signal booster of claim 2, wherein the PCB is configured to provide amplification to a plurality of frequency bands, wherein the plurality of frequency bands comprise Band II, Band IV, Band V, Band XII, and Band XIII.

20. (Previously Presented) An apparatus comprising:

a printed circuit board (PCB) comprising:

a shared amplification path configured to provide amplification to a first downlink channel of a first frequency band and to provide amplification to a second downlink channel of a second frequency band, wherein the first frequency band and the second frequency band are different frequency bands, wherein the shared amplification path is further configured to simultaneously boost both the first downlink channel and the second downlink channel,

wherein the shared amplification path comprises a first band-pass filter configured to pass both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band, and to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band,

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another,

wherein the shared amplification path further comprises at least one amplifier.

21. (Previously Presented) The apparatus of claim 20, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

22. (Previously Presented) The apparatus of claim 20, wherein the at least one amplifier of the shared amplification path comprises a LNA.

23. (Previously Presented) The apparatus of claim 20, wherein the shared amplification path comprises a PA.

24. (Previously Presented) The apparatus of claim 20, wherein the shared amplification path further comprises at least one attenuator.

25. (Previously Presented) The apparatus of claim 20, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

26. (Previously Presented) The apparatus of claim 20, further comprising a multiplexer comprising the first band-pass filter.

27. (Previously Presented) The apparatus of claim 26, wherein the multiplexer multiplexes two frequency bands.

28. (Previously Presented) The apparatus of claim 20, wherein a gain of the shared amplification path is externally controllable.

29. (Previously Presented) The apparatus of claim 20, wherein the shared amplification path further comprises one or more additional band-pass filters, wherein each of the one or more additional band-pass filters are configured to pass both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band, wherein each of the one or more additional band-pass filters is configured to attenuate both the first uplink channel of the first frequency band and the second uplink channel of the second frequency band.

30. (Previously Presented) The apparatus of claim 20, wherein the PCB is configured to provide amplification to a plurality of frequency bands, wherein the plurality of frequency bands comprise Band II, Band IV, Band V, Band XII, and Band XIII.

31. (Previously Presented) A method of boosting radio frequency signals in a signal booster, the method comprising:

providing amplification to a first downlink channel of a first frequency band and to a second downlink channel of a second frequency band using a shared amplification path of the signal booster,

wherein providing amplification comprises simultaneously boosting both the first downlink channel and the second downlink channel using at least one amplifier of the shared amplification path;

passing both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band using a first band-pass filter of the shared amplification path; and

attenuating both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band using the first band-pass filter,

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another.

**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

### **REMARKS**

This paper is filed in response to the non-final Office Action dated March 15, 2016. The Office Action rejects Claims 2-31 on the ground of nonstatutory obviousness-type double patenting. Applicants respectfully request reconsideration of the application in view of the following remarks.

#### **Double Patenting**

The Office Action indicates that Claims 2-31 are rejected on the ground of nonstatutory obviousness type double patenting over Claims 1-29 of U.S. Patent No. 9,100,839.

Applicants have submitted an eTerminal disclaimer via EFS-web. As such, Applicants respectfully request withdrawal of the rejections.

While Applicants have submitted a terminal disclaimer to expedite issuance of the present application, Applicants do not agree or acquiesce that the claims of U.S. Patent No. 9,100,839 are obvious in view of the claims of the present application or that the claims of the present application are obvious in view of U.S. Patent No. 9,100,839.

#### **No Disclaimers or Disavowals**

Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

**Co-Owned Applications of Assignee**

Applicant wishes to draw the Examiner's attention to the following co-owned applications of the present application's assignee.

<b>Docket No.</b>	<b>Serial No. (Pat. No.)</b>	<b>Title</b>	<b>Filed (Issued)</b>
CELLP.001A	US App. No. 13/872877 (US 8,867,572)	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS	4/29/2013 (10/21/2014)
CELLP.001CA	Canadian App. No. 2814303	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS	4/26/2013
CELLP.001C1	US App. No. 14/493260 (US 9,100,839)	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS	9/22/2014 (8/4/2015)
CELLP.001C2	US App. No. 14/811650	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS	7/28/2015

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 22, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

22911786  
032216

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	25273498
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Anthony Bonilla
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	22-MAR-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	17:45:41
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		OAR_CELLP-001C3.pdf	47509 0ce1f7fb1c786d00c2258e215cdc8aca562e c0fa	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	9
Warnings:			
Information:			
Total Files Size (in bytes):		47509	
<p>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.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> 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.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> 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.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> 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.</p>			



<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>14/996,681</b>	Filing Date <b>01/15/2016</b>	<input type="checkbox"/> To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

### APPLICATION AS FILED – PART I

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> 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 \$ =	
<input type="checkbox"/> 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).			
<input type="checkbox"/> 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	(Column 1)	(Column 2)	(Column 3)	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	<b>03/22/2016</b>	CLAIMS REMAINING AFTER AMENDMENT					
	Total (37 CFR 1.16(i))	* 30	Minus	** 30	= 0	X \$40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X \$210 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE						<b>0</b>	

AMENDMENT	(Column 1)	(Column 2)	(Column 3)	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
		CLAIMS REMAINING AFTER AMENDMENT					
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> 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  
/STELLA LITTLE/

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

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



# UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

20995 7590 03/15/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER
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HUYNH, KHOA B

ART UNIT	PAPER NUMBER
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2462

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

03/15/2016

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):

jayna.cartee@knobbe.com  
efiling@knobbe.com

<b>Office Action Summary</b>	<b>Application No.</b> 14/996,681	<b>Applicant(s)</b> ZHAN, HONGTAO	
	<b>Examiner</b> KHOA HUYNH	<b>Art Unit</b> 2462	<b>AIA (First Inventor to File) Status</b> Yes

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

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

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

### Status

- 1) ☒ Responsive to communication(s) filed on 01/15/2016.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims\*

- 5) ☒ Claim(s) 2-31 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 2-31 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

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

### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

### Priority under 35 U.S.C. § 119

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

#### Certified copies:

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

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

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date 01/26/2016; 02/02/2016
- 3) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 4) ☐ Other: \_\_\_\_\_

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The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

## DETAILED ACTION

### *Double Patenting*

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. **Claims 2-31** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 of patent 9,100,839 (application 14,493,260).

3. Although the conflicting claims are not identical, they are not patentably distinct from each other in light of the following evidences.

4. For double patenting to exist as between the rejected claims and patent claims, it must be determined that the rejected claims are not patentably distinct from the patent claims. In order to make this determination, it first must be determined whether there are any differences between the rejected claims and the patent claims and, if so, whether those differences render the claims patentably distinct.

5. The differences between the rejected claims and the patent claims don't render the claims patentably distinct since it had been held that the omission of an element and its function is an obvious expedient if the remaining elements perform the same function as before. *In re Karlson*, 136 USQ 184

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(CCPA). Also note Ex parte Rainu, 168 USPQ 375 (Bd.App.1969); omission of a reference element whose function is not needed would be obvious to one skilled in the art.

***Allowable Subject Matter***

6. **Claims 2-31** would be allowable if a terminal disclaimer is submitted to overcome the Double Patenting rejection set forth in this Office action.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHOA HUYNH whose telephone number is (571)270-7185. The examiner can normally be reached on Monday - Friday 9:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, YEMANE MESFIN can be reached on 571-272-3927. 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.

/KHOA HUYNH/  
Primary Examiner, Art Unit 2462

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2484
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3


U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	6,570,858	05-27-2003	Emmons et al.	
	2	7,729,656	06-01-2010	Van Buren	
	3	7,783,318	08-24-2010	Wilson et al.	
	4	8,867,572	10-21-2014	Zhan	
	5	9,100,839	08-04-2015	Zhan	
	6	2005/0227652	10-13-2005	Kang et al.	
	7	2007/0071128	03-29-2007	Meir et al.	
	8	2008/0233865	09-25-2008	Malarky et al.	
	9	2012/0302188	11-29-2012	Sahota et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>
	10	Representative FCC Approval Documents for Product Code CM5000, made public April 30, 2012, in 47 pages (available at World Wide Web page: <a href="http://transition.fcc.gov/oet/ea/fccid/">transition.fcc.gov/oet/ea/fccid/</a> ).	
	11	Cellphone-Mate Force-5 Manual, April 30, 2012, in 36 pages (available at World Wide Web page: <a href="http://transition.fcc.gov/oet/ea/fccid/">transition.fcc.gov/oet/ea/fccid/</a> ).	
	12	Cellphone-Mate SureCall Press Release, dated April 30, 2012, in 2 pages (available at World Wide Web page <a href="http://cellphone-mate.com/newp/FORCE5.html">cellphone-mate.com/newp/FORCE5.html</a> on April 30, 2012).	
	13	Wilson Sleek 4G Signal Booster Installation Guide, December 4, 2012, in 8 pages (available at World Wide Web page <a href="http://wilsonelectronics.com">wilsonelectronics.com</a> ).	
	14	Wilson AG ProTM Quint Selectable Signal Booster Installation Guide, September 12, 2012 in 16 pages (available at World Wide Web page <a href="http://wilsonelectronics.com">wilsonelectronics.com</a> ).	

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Examiner Signature	/Khoa Huynh/	Date Considered	03/08/2016
<p><b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>			

<b>Search Notes</b>  	<b>Application/Control No.</b>  14996681	<b>Applicant(s)/Patent Under Reexamination</b>  ZHAN, HONGTAO
	<b>Examiner</b>  KHOA HUYNH	<b>Art Unit</b>  2462

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Double Patent Search (PALM, EAST)	03/08/2016	/K.H./
Text Search: EAST (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM TBD)	03/08/2016	/K.H./
NPL Search: Google	03/08/2016	/K.H./
Class Search:		
370/464,480,481,482,492,497	03/08/2016	/K.H./
375/295,296,297	03/08/2016	/K.H./
455/130,150.1,154.1	03/08/2016	/K.H./
H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542	03/08/2016	/K.H./
H04H20/26, H04H40/18	03/08/2016	/K.H./
H04L27/368, H04L27/368	03/08/2016	/K.H./
H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38	03/08/2016	/K.H./

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

	/KHOA HUYNH/ Primary Examiner.Art Unit 2462
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S61	88	amplificat\$4 path band\$pass filter\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S62	23	pass attenuat\$3 downlink uplink and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S63	17	"band xii" "band xiii" and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S64	2	"band xii" "band xiii" and attenuat\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S65	5000	band\$pass\$3 attenuat\$3 band and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S66	88	band\$pass\$3 attenuat\$3 band multiplex\$4 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S67	3	band\$pass\$3 attenuat\$3 band near multiple and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S68	31	("5862460"   "20030211828"	US-PGPUB;	WITH	ON	2016/03/08



		"6259682"   "6374119"   "6055431"   "20060003793"   "20060052131"   "20070149146"   "20050215204"   "20070298838"   "20050264466"   "20080310480"   "20060135071").PN.	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:12
S69	234	band\$pass\$3 attenuat\$3 band and low noise power amplif\$5 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S70	56	band\$pass\$3 uplink downlink and low noise power amplif\$5 and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S71	10	"band xii" "band xiii" and "728" and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S72	6	"band xii" "band xiii" and "728" and pass and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S73	4177	band component channel frequency and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S74	252	downlink near channel (subband or sub\$band) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S75	95	downlink near channel (subband or sub\$band) band and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S76	29	"xii" "xiii" and (sub\$band or subband) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	WITH	ON	2016/03/08 13:12

			IBM_TDB			
S77	5	"xii" "xiii" and (sub\$band or subband) channel and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S78	16	"xii" "xiii" and (sub\$band or subband) and downlink and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S79	820	acoustic wave ceramic filter and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S80	59	acoustic wave ceramic filter band\$pass and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S81	450	amplificat\$4 adjacent adj channel and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S82	2720	amplif\$5 adjacent adj channel and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S83	85	amplif\$5 near adjacent adj channel and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S84	15	amplif\$5 near adjacent adj channels and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S85	3	amplif\$5 near adjacent adj bands and (@ad< "20130429" or @rlad< "20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO;	WITH	OFF	2016/03/08 13:12

			JPO; DERWENT; IBM_TDB			
S86	18	amplif\$5 near adjacent adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S87	18	amplif\$5 near (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S88	19	(amplif\$5 or boost\$4) near (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S89	2	(shared near path) (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S90	30	(shared near path) and (adjacent or abutting or nearby) adj (bands or channels or frequencies) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S91	2437	amplif\$7 same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S92	10	amplif\$7 shared same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S93	16	amplif\$7 near common same ((adjacent or abutting or nearby) adj (bands or channels or frequencies)) and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S94	10	amplif\$7 near common same ((multiple) adj (bands or channels or	US-PGPUB; USPAT;	WITH	OFF	2016/03/08 13:12

		frequencies)) and (@ad<"20130429" or @rlad<"20130429")	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S95	6	amplif\$7 same multi-band near repeater and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S96	23	(adjacent or abutting or nearby) adj (channels) same different adj bands and (@ad<"20130429" or @rlad<"20130429")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2016/03/08 13:12
S97	4	((HONGTAO) near2 (ZHAN)).INV.	US-PGPUB; USPAT	WITH	ON	2016/03/08 13:12
S98	4	S97 and (band\$pass filter\$4).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S99	4	S97 and (amplif\$9).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S100	5174	370/464,480,481,482,492,497.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S101	15675	375/295,296,297.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S102	2723	455/130,150.1,154.1.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S103	19523	(H04B1/26, H04B1/30, H04B1/40, H04B7/15507, H04B7/15542).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	WITH	ON	2016/03/08 13:12

			DERWENT; IBM_TDB			
S104	6188	(H04H20/26, H04H40/18).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S105	2983	(H04L27/368, H04L27/368).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S106	36651	(H04W16/26, H04W24/02, H04W52/04, H04W52/18, H04W52/38).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S107	490	(S100 or S101 or S102 or S103 or S104 or S105 or S106) and ((shared or common or "same") amplif\$9) and (downlink or uplink)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12
S108	620	(S100 or S101 or S102 or S103 or S104 or S105 or S106) and (amplif\$9 (downlink or uplink)) and band	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2016/03/08 13:12

3/ 8/ 2016 1:27:48 PM  
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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	2014/0292593	10-02-2014	Thiam et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

22607033  
020216

Examiner Signature	/Khoa Huynh/	Date Considered	03/08/2016
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH EX/KH/1004



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
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Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/996,681	01/15/2016	Hongtao Zhan	CELLP.001C3	4273

20995 7590 03/11/2016  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER
----------

HUYNH, KHOA B

ART UNIT	PAPER NUMBER
----------	--------------

2462

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

03/11/2016

ELECTRONIC

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

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

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

jayna.cartee@knobbe.com  
efiling@knobbe.com



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

Doc Code:  
TRACK1.GRANT

**Decision Granting Request for  
Prioritized Examination  
(Track I or After RCE)**

Application No.: 14/996,681

1. THE REQUEST FILED 1/15/16 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 Terri Johnson at 571-272-2991. In his/her absence, calls may be directed to Brian Brown at 571-272-5338

/Terri Johnson/

Paralegal Specialist

[Signature]

(Title)



## Office of Petitions: Decision Count Sheet

Mailing Month

3

Application No.

14996681



For US serial numbers: enter number only, no slashes or commas. Ex: 10123456

For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official:

Johnson, Terri

**Count (1) - Palm Credit**

14/996 681

FINANCE WORK NEEDED

Decision:

GRANT

☐ Select Check Box for YES

Decision Type:

643 - Track One request



Notes:

**Count (2)**

FINANCE WORK NEEDED

Decision:

n/a

☒ Select Check Box for YES

Decision Type:

NONE

Notes:

**Count (3)**

FINANCE WORK NEEDED

Decision:

n/a

☐ Select Check Box for YES

Decision Type:

NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach  
2nd count sheet & mark this box

Printed on: 3/6/2016

Office of Petitions Internal Document - Ver. 5.0

## Office of Petitions: Routing Sheet



**Application No. 14/996,681**

**This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.**

☒ **GRANTED**

☐ **DISMISSED**

☐ **DENIED**

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2462
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	2014/0292593	10-02-2014	Thiam et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>

22607033  
020216

Examiner Signature	Date Considered
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	24800736
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Alanna Wai
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	02-FEB-2016
<b>Filing Date:</b>	15-JAN-2016
<b>Time Stamp:</b>	18:07:44
<b>Application Type:</b>	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		IDS_CELLP-001C3.pdf	40488 f7e310ce8d00fe95d2b9fb042ed590da687436c5	yes	3

	<b>Multipart Description/PDF files in .zip description</b>		
	<b>Document Description</b>	<b>Start</b>	<b>End</b>
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3
<b>Warnings:</b>			
<b>Information:</b>			
<b>Total Files Size (in bytes):</b>		40488	
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>			

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**INFORMATION DISCLOSURE STATEMENT**

Inventor	:	Hongtao Zhan
App. No.	:	14/996,681
Filed	:	January 15, 2016
For	:	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	:	Unknown
Art Unit	:	2462
Conf. No.	:	4273

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

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Copies of any listed foreign and non-patent literature references are being submitted.

**No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

**Timing of Disclosure**

This Information Disclosure Statement is being filed within three months of the filing date, and no fee is believed to be required.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: February 2, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

22607114  
020216

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875						Application or Docket Number 14/996,681			
<b>APPLICATION AS FILED - PART I</b>									
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A			
SEARCH FEE (37 CFR 1.16(k), (l), 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(j))	30	minus 20 = * 10	x 40 =	400	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					
			TOTAL	1130		TOTAL			
* If the difference in column 1 is less than zero, enter "0" in column 2.									
<b>APPLICATION AS AMENDED - PART II</b>									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.									





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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
14/996,681	01/15/2016	2484	1130	CELLP.001C3	30	3

CONFIRMATION NO. 4273

FILING RECEIPT



0000000080194827

20995  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

Date Mailed: 02/01/2016

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**

**Inventor(s)**

Hongtao Zhan, Fremont, CA;

**Applicant(s)**

CELLPHONE-MATE, INC., Fremont, CA;

**Power of Attorney:** The patent practitioners associated with Customer Number 20995

**Domestic Priority data as claimed by applicant**

This application is a CON of 14/811,650 07/28/2015  
which is a CON of 14/493,260 09/22/2014 PAT 9100839  
which is a CON of 13/872,877 04/29/2013 PAT 8867572

**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:** Yes

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:** 01/28/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/996,681**

**Projected Publication Date:** 05/12/2016

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

**Preliminary Class**

386

**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 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).

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**Title 37, Code of Federal Regulations, 5.11 & 5.15**

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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 Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

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

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	14/996,681
	Filing Date	January 15, 2016
	First Named Inventor	Hongtao Zhan
	Art Unit	2484
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 1	Attorney Docket No.	CELLP.001C3

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number <i>Number - Kind Code (if known)</i> Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	6,570,858	05-27-2003	Emmons et al.	
	2	7,729,656	06-01-2010	Van Buren	
	3	7,783,318	08-24-2010	Wilson et al.	
	4	8,867,572	10-21-2014	Zhan	
	5	9,100,839	08-04-2015	Zhan	
	6	2005/0227652	10-13-2005	Kang et al.	
	7	2007/0071128	03-29-2007	Meir et al.	
	8	2008/0233865	09-25-2008	Malarky et al.	
	9	2012/0302188	11-29-2012	Sahota et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document <i>Country Code-Number-Kind Code</i> Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>
	10	Representative FCC Approval Documents for Product Code CM5000, made public April 30, 2012, in 47 pages (available at World Wide Web page: <a href="http://transition.fcc.gov/oet/ea/fccid/">transition.fcc.gov/oet/ea/fccid/</a> ).	
	11	Cellphone-Mate Force-5 Manual, April 30, 2012, in 36 pages (available at World Wide Web page: <a href="http://transition.fcc.gov/oet/ea/fccid/">transition.fcc.gov/oet/ea/fccid/</a> ).	
	12	Cellphone-Mate SureCall Press Release, dated April 30, 2012, in 2 pages (available at World Wide Web page <a href="http://cellphone-mate.com/newp/FORCE5.html">cellphone-mate.com/newp/FORCE5.html</a> on April 30, 2012).	
	13	Wilson Sleek 4G Signal Booster Installation Guide, December 4, 2012, in 8 pages (available at World Wide Web page <a href="http://wilsonelectronics.com">wilsonelectronics.com</a> ).	
	14	Wilson AG Pro™ Quint Selectable Signal Booster Installation Guide, September 12, 2012 in 16 pages (available at World Wide Web page <a href="http://wilsonelectronics.com">wilsonelectronics.com</a> ).	

22555991  
012616

Examiner Signature	Date Considered
<b>*Examiner:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T<sup>1</sup> - Place in this area when an English language Translation is attached. **Wilson Exhibit 1004**

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	24730055
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Alanna Wai
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	26-JAN-2016
<b>Filing Date:</b>	
<b>Time Stamp:</b>	18:21:19
<b>Application Type:</b>	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		IDS_CELLP-001C3.pdf	54147 70169fcac32164f21717d58133da6dc184d9e98c	yes	3

	<b>Multipart Description/PDF files in .zip description</b>		
	<b>Document Description</b>	<b>Start</b>	<b>End</b>
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3
<b>Warnings:</b>			
<b>Information:</b>			
<b>Total Files Size (in bytes):</b>		54147	
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>			

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**INFORMATION DISCLOSURE STATEMENT**

Inventor	: Hongtao Zhan
App. No.	: 14/996,681
Filed	: January 15, 2016
For	: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	: Unknown
Art Unit	: 2484
Conf. No.	: 4273

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

**References and Listing**

Pursuant to 37 CFR 1.56, an Information Disclosure Statement listing references is provided herewith. Listed non-patent literature documents are of record in U.S. patent application No. 13/872,877, filed April 29, 2013, which is a parent of this continuation application, and is relied upon for an earlier filing date under 35 USC § 120. Copies of the non-patent literature documents are not submitted pursuant to 37 CFR § 1.98(d).

Included on the list are representative documents related to Federal Communications Commission (FCC) approval of a signal booster with Product Code CM5000, which is an embodiment of the invention. Documents and information related to the CM5000 product were submitted to the FCC in confidence prior to April 30, 2012. The FCC approved the CM5000 product on April 30, 2012, and made public a portion of the documents on the same date. The Examiner is invited to contact the Applicant and/or to enter Product Code "CM5000" on World Wide Web page "[transition.fcc.gov/oet/ea/fccid/](http://transition.fcc.gov/oet/ea/fccid/)" to obtain additional information.

**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

### **No Disclaimers**

To the extent that anything in the Information Disclosure Statement or the listed references could be construed as a disclaimer of any subject matter supported by the present application, Applicant hereby rescinds and retracts such disclaimer.

### **Timing of Disclosure**

This Information Disclosure Statement is being filed within three months of the filing date and no fee is believed to be required.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: January 26, 2016

By: /David Trossen/

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

22556002  
012616



## TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/996,681
Filing Date	January 15, 2016
First Named Inventor	Hongtao Zhan
Title	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Art Unit	2484
Examiner Name	Unknown
Attorney Docket Number	CELLP.001C3

### SIGNATURE of Applicant or Patent Practitioner

Signature	/David Trossen/	Date (Optional)	01-25-2016
Name	David Trossen	Registration Number	59406
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



\*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 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.**

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82B(07-12)

Approved for use through 11/30/2014. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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## POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

20995

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

I am the Applicant:


☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature		Date	6/7/2013
Name	Hongtao Zhan	Telephone	310 366 5445
Title and Company	CEO, CELLPHONE-MATE, INC.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below \*.

☐ Total of 1 forms are submitted.

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.

## 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.

Please Direct All Correspondence to Customer Number 20995

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**RESCISSION OF ANY PRIOR DISCLAIMERS AND REQUEST TO REVISIT ART**

Inventor	: Hongtao Zhan
App. No	: 14/996,681
Filed	: January 15, 2016
For	: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	: Unknown
Art Unit	: 2484
Conf #	: 4273

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

Dear Sir:

The claims of the present application are different and possibly broader in scope than the claims pursued in the parent applications. To the extent any prior amendments or characterizations of the scope of any claim or referenced art could be construed as a disclaimer of any subject matter supported by the present disclosure, Applicant hereby rescinds and retracts such disclaimer. Accordingly, the references previously considered in the parent applications may need to be re-visited.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Knobbe, Martens, Olson & Bear, LLP

Respectfully submitted,

Dated: January 25, 2016

/David Trossen/

David Trossen

Registration No. 59,406

Attorney of Record

Customer No. 20995

(415) 954-4114

22541841  
012516

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	24714171
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/ThuyQuyen Nguyen
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	25-JAN-2016
<b>Filing Date:</b>	
<b>Time Stamp:</b>	16:25:44
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_CELLP-001C3.pdf	127539 d761643a2002c86c284912b458ffeedfde3b4ad5	no	3

### Warnings:

### Information:

2	Miscellaneous Incoming Letter	Rescission_CELLP-001C3.pdf	15149	no	1
			159b8f8bfd3022014fb49bb6f947b91f6e40892a		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>				142688	
<p><b>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.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>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.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>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.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>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.</b></p>					

**CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION  
UNDER 37 CFR 1.102(e) (Page 1 of 1)**

First Named Inventor:	Hongtao Zhan	Nonprovisional Application Number (if known):	
Title of Invention:	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		

**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 <u>/David Trossen/</u>	Date <u>January 15, 2016</u>
Name (Print/Typed) <u>David Trossen</u>	Practitioner Registration Number <u>59,406</u>

**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.

## 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.



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.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	CELLP.001C3
		Application Number	
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		
<p>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.</p> <p>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.</p>			

**Secrecy Order 37 CFR 5.2:**

<input type="checkbox"/>	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				<a href="#">Remove</a>	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Hongtao		Zhan			
Residence Information (Select One) • <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	Fremont	State/Province	CA	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	48346 Milmont Drive					
Address 2						
City	Fremont	State/Province	CA			
Postal Code	94538	Country	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the <b>Add</b> button. <a href="#">Add</a>						

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	20995		
Email Address	efiling@knobbe.com	<a href="#">Add Email</a>	<a href="#">Remove Email</a>

**Application Information:**

Title of the Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		
Attorney Docket Number	CELLP.001C3	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	1

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	CELLP.001C3
		Application Number	
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		

### 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

### 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.

### 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:	<input checked="" type="radio"/> Customer Number	US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	20995		

### Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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" field blank.

Prior Application Status	Pending	<a href="#">Remove</a>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	14/811650	2015-07-28

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number		CELLP.001C3	
		Application Number			
Title of Invention		APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS			
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/811650	Continuation of	14/493260	2014-09-22	9100839	2015-08-04
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/493260	Continuation of	13/872877	2013-04-29	8867572	2014-10-21
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.					Add

## Foreign Priority Information:

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			Remove
Application Number	Country <sup>i</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>i</sup> (if applicable)
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## 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.

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number CELLP.001C3	
	Application Number	
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS	

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When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	CELLP.001C3
		Application Number	
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		

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<b>Applicant</b>	1	<input type="button" value="Remove"/>
<p>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.</p>		
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<input checked="" type="radio"/> Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
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Organization Name	CELLPHONE-MATE, INC.	
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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	CELLP.001C3
		Application Number	
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		

<b>Assignee</b>	1			
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See 37 CFR 1.4(d) for the manner of making signatures and certifications.

<b>Signature</b>	/David Trossen/		Date (YYYY-MM-DD)	2016-01-15
First Name	David	Last Name	Trossen	Registration Number
				59406
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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	CELLP.001C3
		Application Number	
Title of Invention	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		

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.**

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**APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS****CROSS-REFERENCE TO RELATED APPLICATIONS**

**[0001]** This application is a continuation of U.S. Patent Application No. 14/811,650, filed July 28, 2015, titled “APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS,” which is a continuation of U.S. Patent Application No. 14/493,260, filed September 22, 2014, titled “APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS,” now U.S. Patent No. 9,100,839, issued August 4, 2015, which is a continuation of U.S. Patent Application No. 13/872,877, filed April 29, 2013, titled “APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS,” now U.S. Patent No. 8,867,572, issued October 21, 2014, each of which are herein incorporated by reference in their entireties.

**BACKGROUND****Field**

**[0002]** Embodiments of the invention relate to electronic systems and, in particular, to radio frequency (RF) signal boosters.

**Description of the Related Technology**

**[0003]** A cellular or mobile network can include base stations for communicating with wireless devices located within the network’s cells. For example, the base stations can transmit signals to wireless devices via a downlink channel and can receive signals from the wireless devices via an uplink channel. In the case of a network operating using frequency division duplexing (FDD), the downlink and uplink channels are separate in the frequency domain such that the frequency band operates using a pair of frequency channels.

**[0004]** A wireless device may be unable to communicate with any of the base stations when located in a portion of the mobile network having poor or weak signal strength. For example, the wireless device may be unable to communicate with a particular base station when the wireless device and the base station are separated by a large distance.

Additionally, structures such as buildings or mountains can interfere with the transmission and/or reception of signals sent between the wireless device and a base station.

**[0005]** To improve the network's signal strength and/or the network's coverage, a radio frequency (RF) signal booster or repeater can be used to amplify signals in the network. For example, the signal booster can be used to amplify or boost signals having frequencies associated with the frequency ranges of the network's uplink and downlink channels. In certain configurations, a signal booster can be used to provide network coverage inside of a structure, such as a home or building. However, other configurations are possible, such as implementations in which the signal booster is used to provide coverage to remote network areas or in which the signal booster is coupled to a vehicle such as an automobile, bus, or train and used to boost network signals as the vehicle's position changes over time.

#### SUMMARY

**[0006]** In one embodiment, a radio frequency signal booster includes a first amplification path, a second amplification path, and a third amplification path. The first amplification path includes a first band-pass filter configured to pass a first channel of a first frequency band and to attenuate a second channel of the first frequency band. The first channel has a first channel type and the second channel has a second channel type. Additionally, the first channel type comprises one of an uplink channel or a downlink channel, and the second channel type comprises the other of the uplink channel and the downlink channel. The second amplification path includes a second band-pass filter configured to pass a first channel of a second frequency band and to attenuate a second channel of the second frequency band. The first channel of the second frequency band has the first channel type, and the second channel of the second frequency band has the second channel type. The third amplification path includes a third band-pass filter configured to pass both the second channel of the first frequency band and the second channel of the second frequency band. The third band-pass filter is further configured to attenuate both the first channel of the first frequency band and the first channel of the second frequency band.

**[0007]** In another embodiment, a multiplexer includes an antenna terminal, a first terminal, a second terminal, a third terminal, a first band-pass filter, a second band-pass filter,

and a third band-pass filter. The first band-pass filter is electrically connected between the first terminal and the antenna terminal. Additionally, the first band-pass filter is configured to pass a first channel of a first frequency band and to attenuate a second channel of the first frequency band. The first channel has a first channel type and the second channel has a second channel type. The first channel type comprises one of an uplink channel or a downlink channel, and the second channel type comprises the other of the uplink channel and the downlink channel. The second band-pass filter is electrically connected between the second terminal and the antenna terminal. The second band-pass filter is configured to pass a first channel of a second frequency band and to attenuate a second channel of the second frequency band. The first channel of the second frequency band has the first channel type, and the second channel of the second frequency band has the second channel type. The third band-pass filter is electrically connected between the third terminal and the antenna terminal. The third band-pass filter is configured to pass both the second channel of the first frequency band and the second channel of the second frequency band. The third band-pass filter is further configured to attenuate both the first channel of the first frequency band and the first channel of the second frequency band.

**[0008]** In another embodiment, a method of radio frequency signal boosting is provided. The method includes passing a first channel of a first frequency band using a first band-pass filter and attenuating a second channel of the first frequency band using the first band-pass filter. The first channel has a first channel type and the second channel has a second channel type. The first channel type comprises one of an uplink channel or a downlink channel, and the second channel type comprises the other of the uplink channel and the downlink channel. The method further includes passing a first channel of a second frequency band using a second band-pass filter, and attenuating a second channel of the second frequency band using the second band-pass filter. The first channel of the second frequency band has the first channel type, and the second channel of the second frequency band has the second channel type. The method further includes passing both the second channel of the first frequency band and the second channel of the second frequency band using a third band-pass filter, and attenuating both the first channel of the first frequency band and the first channel of the second frequency band using the third band-pass filter.

**[0009]** In another embodiment, a radio frequency signal booster includes a housing, a first printed circuit board (PCB) positioned within a first cavity of the housing, a second PCB positioned within a second cavity of the housing, and a shielding structure positioned between the first PCB and the second PCB. The first PCB includes a first plurality of amplification paths configured to boost a first plurality of radio frequency bands, and the first plurality of radio frequency bands each have a frequency less than about 1 GHz. The second PCB includes a second plurality of amplification paths configured to boost a second plurality of radio frequency bands, and the second plurality of radio frequency bands each have a frequency greater than about 1 GHz.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** Figure 1 is a schematic block diagram of one example of a mobile network.

**[0011]** Figure 2A is a schematic diagram of one example of a portion of a frequency spectrum.

**[0012]** Figure 2B is schematic diagram of the frequency spectrum of Figure 2A with annotations showing frequency locations of band-pass filter passbands according to one embodiment.

**[0013]** Figure 3 is a schematic diagram of a signal booster for uplink and downlink channels for two bands according to one embodiment.

**[0014]** Figure 4 is a schematic diagram of a signal booster for uplink and downlink channels for five bands according to another embodiment.

**[0015]** Figure 5A is a schematic diagram of a multiplexer according to one embodiment.

**[0016]** Figure 5B is a schematic diagram of a multiplexer according to another embodiment.

**[0017]** Figure 6A is a perspective view of a signal booster in accordance with one embodiment.

**[0018]** Figure 6B is a top plan view of the signal booster of Figure 6A with a top cover removed and with a first metal layer removed.

**[0019]** Figure 6C is a bottom plan view of the signal booster of Figure 6A with a bottom cover removed and with a portion of a second metal layer removed.

**[0020]** Figure 6D is a cross-section of the signal booster of Figures 6A-6C taken along the lines 6D-6D.

#### DETAILED DESCRIPTION OF EMBODIMENTS

**[0021]** The following detailed description of certain embodiments presents various descriptions of specific embodiments of the invention. However, the invention can be embodied in a multitude of different ways as defined and covered by the claims. In this description, reference is made to the drawings where like reference numerals may indicate identical or functionally similar elements.

**[0022]** Figure 1 is a schematic block diagram of one example of a mobile network 10. The mobile network 10 includes a base station 1, a signal booster 2, a plurality of mobile devices 3a-3c (three shown), and a network device 4.

**[0023]** The signal booster 2 is electrically coupled to a first antenna 5a and to a second antenna 5b. The signal booster 2 can retransmit signals to and receive signals from the base station 1 using the first antenna 5a, and can retransmit signals to and receive signals from the plurality of mobile devices 3a-3c and/or the network device 4 using the second antenna 5b. For example, the signal booster 2 can retransmit signals to the base station 1 over one or more uplink channels, and can receive signals from the base station 1 over one or more downlink channels. Additionally, the signal booster 2 can retransmit signals to the plurality of mobile devices 3a-3c and/or the network device 4 over one or more downlink channels, and can receive signals from the devices over one or more uplink channels. In one embodiment, the first antenna 5a is an outdoor antenna positioned external to a structure such as a home or building and the second antenna 5a is an indoor antenna positioned within the structure. However, other configurations are possible. In the illustrated configuration, the first and second antennas 5a, 5b can be external to the signal booster 2, and can be connected, using, for example, cables. However, other configurations are possible, including, for example, configurations in which the antennas are integrated as part of a signal booster. While illustrated with a common housing for boosting all frequency bands of interest, the

teachings herein are applicable to configurations in which the signal booster 2 is implemented in multiples boxes or housings that communicate with one another, such as over a wireless communication channel at different frequency than the frequency bands the signal booster 2 boosts.

**[0024]** Although Figure 1 illustrates the signal booster 2 as communicating with one base station, the signal booster 2 typically communicates with multiple base stations. For example, the signal booster 2 can be used to communicate with base stations associated with different cells of a network. Furthermore, in certain implementations, the signal booster 2 can communicate with base stations associated with different networks, including, for example, networks associated with different wireless carriers and/or networks associated with different RF frequencies or bands.

**[0025]** For example, the mobile devices 3a-3c and/or the network device 4 can communicate at least in part over multiple frequency bands, including, for example, Universal Mobile Telecommunications System (UMTS) Band II, Band IV, Band V, Band XII, and/or Band XIII. For instance, in one example, the first mobile device 3a can operate using Advanced Wireless Services (AWS) (Band IV), the second mobile device 3b can operate using Personal Communication Services (PCS) (Band II), and the third mobile device 3c can operate using Cellular (CLR) services (Band V). Furthermore, in certain configurations, all or a subset of the mobile devices 3a-3c and/or the network device 4 can communicate using Long Term Evolution (LTE), and may transmit and receive Band XII signals, Band XIII signals, and/or signals associated with other LTE bands. Although specific examples of frequency bands and communication technologies have been described above, the teachings herein are applicable to a wide range of frequency bands and communications standards.

**[0026]** Accordingly, the signal booster 2 can be configured to boost signals associated with multiple frequency bands so as to improve network reception for each of the mobile devices 3a-3c and the network device 4. Configuring the signal booster 2 to service multiple frequency bands can improve network signal strength for multiple devices. For example, the signal booster 2 can improve network signal strength of devices using the same or different frequency bands, the same or different wireless carriers, and/or the same or

different wireless technologies. Configuring the signal booster 2 as a multi-band repeater can avoid the cost of separate signal boosters for each specific frequency band and/or wireless carrier. Additionally, configuring the signal booster 2 as a multi-band repeater can also ease installation, reduce cabling, and/or issues associated with combining multiple repeaters.

**[0027]** The plurality of mobile devices 3a-3c can represent a wide range of mobile or portable communication devices, including, for example, multi-band mobile phones. The network device 4 can represent a wide range of other devices configured to communicate over one or more mobile networks, including, for example, computers, televisions, modems, routers, or other electronics. In one embodiment, the network device 4 is another signal booster. Although Figure 1 illustrates the signal booster 2 as communicating with three mobile devices 3a-3c and one network device 4, the signal booster 2 can be used to communicate with more or fewer mobile devices and/or more or fewer network devices.

**[0028]** Figure 2A is a schematic diagram of one example of a portion of a frequency spectrum 20. The frequency spectrum 20 includes a Band XII uplink channel, a Band XII downlink channel, a Band XIII downlink channel, a Band XIII uplink channel, a Band V uplink channel, a Band V downlink channel, a Band IV uplink channel, a Band II uplink channel, a Band II downlink channel, and a Band IV downlink channel. The frequency spectrum 20 of Figure 2A illustrates one example of the frequency bands that a signal booster described herein can be used to boost. However, other configurations are possible, such as implementations in which the signal booster amplifies more or fewer frequency bands and/or a different combination of frequency bands.

**[0029]** In certain implementations, the Band XII uplink channel can have a frequency range of about 698 MHz to about 716 MHz, and the Band XII downlink channel can have a frequency range of about 728 MHz to about 746 MHz. Additionally, in certain implementations the Band XIII uplink channel can have a frequency range of about 776 MHz to about 787 MHz, and the Band XIII downlink channel can have a frequency range of about 746 MHz to about 757 MHz. Furthermore, in certain implementations the Band V uplink channel can have a frequency range of about 824 MHz to about 849 MHz, and the Band V downlink channel can have a frequency range of about 869 MHz to about 894 MHz. Additionally, in certain implementations the Band IV uplink channel can have a frequency

range of about 1710 MHz to about 1755 MHz, and the Band IV downlink channel can have a frequency range of about 2110 MHz to about 2155 MHz. Furthermore, in certain implementations the Band II uplink channel can have a frequency range of about 1850 MHz to about 1910 MHz, and the Band II downlink channel can have a frequency range of about 1930 MHz to about 1990 MHz.

**[0030]** Although specific frequency ranges have been provided above, persons of ordinary skill in the art will appreciate that the frequencies of the bands can vary by geographical region and/or can change over time based on regulations set by governing agencies such as the Federal Communications Commission (FCC) or the Canadian Radio-television and Telecommunications Commission (CRTC). Additionally, the teachings herein are applicable to configurations in which a signal booster provides amplification to a portion of the sub-bands associated with one or more frequency bands. For example, certain frequency bands, including, for example, the PCS band, can be associated with a plurality of sub-bands, and the teachings herein are applicable to configurations in which the signal booster operates to provide boosting for only some of the sub-bands.

**[0031]** Certain signal boosters can use a separate amplification path for each channel of each frequency band that the signal booster is used to boost or repeat. For example, each amplification path of the signal booster can include a band-pass filter having a passband for passing a particular uplink or downlink channel while attenuating or blocking other frequencies. Configuring the signal booster in this manner can aid in maintaining the booster's compliance with communication standards and/or regulator rules, such as those limiting spurious and/or out-of-band emissions.

**[0032]** The radio frequency spectrum has become increasingly crowded with signals as mobile technologies have advanced and the demand for high speed wireless communication has expanded. For example, there has been an increase in a number and proximity of frequency bands that are being utilized by mobile devices and networks.

**[0033]** The increased crowding of the radio frequency spectrum has constrained the design and development of signal boosters, particular multi-band signal boosters that provide boosting across multiple frequency bands, including, for example, adjacent frequency bands. For example, a band-pass filter used to select a particular uplink or downlink channel



for boosting can have a non-ideal passband associated with roll-off near the passband's edges. The filter's roll-off can lead to an increase in undesired spurious and/or out-of-band emissions associated with amplification of signals outside of the particular channel's frequency band. Although a particular uplink or downlink channel may be selected by using a relatively sharp filter such as a cavity filter, such filters can be prohibitive in cost and/or size.

**[0034]** Provided herein are apparatus and methods for RF signal boosters. In certain implementations, a multi-band signal booster is provided for boosting the uplink and downlink channels of at least a first frequency band and a second frequency band. The first and second frequency bands can be closely positioned in frequency, and the first and second frequency bands can include uplink or downlink channels that are adjacent. For example, the duplex of the first and second frequency bands can be reversed such that the order in frequency of the first frequency band's uplink and downlink channels is flipped or reversed relative to the second frequency band's uplink and downlink channels. However, other configurations are possible, such as when two frequency bands have that are disjoint, and the uplink and/or downlink channels of the bands are adjacent.

**[0035]** In certain configurations, the downlink channels of the first and second channels are adjacent, and the signal booster includes a first amplification path for boosting the uplink channel of the first frequency band, a second amplification path for boosting the uplink channel of the second frequency band, and a third amplification path for boosting the downlink channels of the first and second frequency bands. For example, the first amplification path can include a first band-pass filter for passing the first frequency band's uplink channel and for attenuating other frequencies such as the first frequency band's downlink channel, and the second amplification path can include a second band-pass filter for passing the second frequency band's uplink channel and for attenuating other frequencies such as the second frequency band's downlink channel. Additionally, the third amplification path can include a third band-pass filter for passing the downlink channels of the first and second frequency bands and for attenuating other frequencies such as the uplink channels of the first and second frequency bands. Thus, the signal booster can include a shared

amplification path that operates to boost or repeat the downlink channels of adjacent frequency bands.

**[0036]** However, in other configurations, the uplink channels of the first and second channels are adjacent, and the signal booster includes a first amplification path for boosting the downlink channel of the first frequency band, a second amplification path for boosting the downlink channel of the second frequency band, and a third amplification path for boosting the uplink channels of the first and second frequency bands.

**[0037]** The signal boosters described herein can be used to boost multiple frequency bands, thereby improving signal strength for devices using different communications technologies and/or wireless carriers. Configuring the signal booster in this manner can avoid the cost of multiple signal boosters, such as having a specific signal booster for each frequency band. Additionally, the signal boosters can have reduced component count and/or size, since band-pass filters, amplifiers, attenuators and/or other circuitry can be shared for at least two channels. Furthermore, the signal boosters herein can be implemented without the cost of filters with relatively sharp passbands, such as cavity filters, which can have a high cost and/or a large area. Thus, the signal boosters herein can be implemented using filters having a relatively low cost and/or a relatively small size, such as surface acoustic wave (SAW) filters and/or ceramic filters.

**[0038]** Figure 2B is schematic diagram of the frequency spectrum of Figure 2A with annotations showing frequency locations of band-pass filter passbands according to one embodiment.

**[0039]** In the illustrated configuration, a first band-pass filter passband 31 has been implemented to pass or select a Band XII uplink channel, and a second band-pass filter passband 32 has been implemented to pass a Band XIII uplink channel. Furthermore, a third band-pass filter passband 33 has been implemented to pass both a Band XII downlink channel and a Band XIII downlink channel. Additionally, a fourth band-pass filter passband 34 has been implemented to pass a Band V uplink channel, and a fifth band-pass filter passband 35 has been implemented to pass a Band V downlink channel. Furthermore, a sixth band-pass filter passband 36 has been implemented to pass a Band IV uplink channel, and a seventh band-pass filter passband 37 has been implemented to pass a Band II uplink

channel. Additionally, an eighth band-pass filter passband 38 has been implemented to pass a Band II downlink channel, and a ninth band-pass filter passband 39 has been implemented to pass a Band IV downlink channel. Although Figure 2B illustrates a single passband for each frequency channel, a signal booster can include a plurality of band-pass filters that are cascaded, with or without intervening circuitry, to achieve an overall channel filtering.

**[0040]** As used herein, a band-pass filter can “pass” a particular frequency channel when the frequency channel is substantially within the band-pass filter’s passband, even when the passband provides gain or loss in the passband. Accordingly, the teachings herein are not limited to band-pass filters having unity-gain passbands. Furthermore, in certain implementations, a band-pass filter herein can be implemented by cascading a low-pass filter and a high-pass filter. For example, cascading a high-pass filter having a cutoff frequency of  $f_1$  and a low-pass filter having a cutoff frequency of  $f_2$ , where  $f_2$  is greater than  $f_1$ , can operate to provide a band-pass filter having a passband between about  $f_1$  and about  $f_2$ .

**[0041]** As shown in Figure 2B, the third band-pass filter passband 33 advantageously passes the downlink channels of both Band XII and Band XIII, which are adjacent frequency bands. The illustrated configuration takes advantage of the reverse duplex of the Band XIII frequency band relative to that of the Band XII frequency band. For example, a typical frequency band such as Band XIII, Band II, Band IV, and Band V uses an uplink channel that is at a lower frequency than a corresponding downlink channel of the same band. However, Band XIII uses a reverse configuration in which the downlink channel is at a lower frequency relative to the uplink channel. Configuring a signal booster to have a band-pass filter that passes both the Band XII and Band XIII downlink signals can avoid a need for sharp band-pass filters for separately filtering the downlink bands, which can be difficult using relative small and/or low-cost filters such as SAW filters and/or ceramic filters, which can have a non-ideal passband and can provide insufficient channel filtering or selectivity.

**[0042]** Figure 3 is a schematic diagram of a signal booster 50 for uplink and downlink channels for two bands according to one embodiment. The signal booster 50 includes first and second multiplexers 55a, 55b, first to third amplification paths or circuits

51-53, and a control circuit 54. In the illustrated configuration, the signal booster 50 is electrically coupled to the first and second antennas 5a, 5b, such as by cables or wires. However, other configurations are possible, including, for example, configurations in which the antennas are integrated with a signal booster.

**[0043]** The first multiplexer 55a includes a first terminal electrically connected to an output of the first amplification path 51, a second terminal electrically connected to an output of the second amplification path 52, a third terminal electrically connected to an input of the third amplification path 53, and an antenna terminal electrically connected to the first antenna 5a. The second multiplexer 55b includes a first terminal electrically connected to an input of the first amplification path 51, a second terminal electrically connected to an input of the second amplification path 52, a third terminal electrically connected to an output of the third amplification path 53, and an antenna terminal electrically connected to the second antenna 5b.

**[0044]** The first amplification path 51 includes a first low noise amplifier (LNA) 61a, a first band-pass filter 62a, a first attenuator 63a, and a first power amplifier (PA) 64a. The first LNA 61a, the first band-pass filter 62a, the first attenuator 63a, and the first PA 64a are cascaded with an input of the first LNA 61a operating as the first amplification path's input and with an output of the first PA 64a operating as the first amplification path's output. The second amplification path 52 includes a second LNA 61b, a second band-pass filter 62b, a second attenuator 63b, and a second PA 64b. The second LNA 61b, the second band-pass filter 62b, the second attenuator 63b, and the second PA 64b are cascaded with an input of the second LNA 61b operating as the second amplification path's input and with an output of the second PA 64b operating as the second amplification path's output. The third amplification path 53 includes a third LNA 61c, a third band-pass filter 62c, a third attenuator 63c, and a third PA 64c. The third LNA 61c, the third band-pass filter 62c, the third attenuator 63c, and the third PA 64c are cascaded with an input of the third LNA 61c operating as the third amplification path's input and with an output of the third PA 64c operating as the third amplification path's output.

**[0045]** In one embodiment, the gain of each of the first to third amplification paths 51-53 is selected to be in the range of about 10 dB to about 90 dB. In certain

configurations, the gain of one or more of the first to third amplification paths 51-53 can be externally controlled, such as by using one or more switches and/or by using digital configuration. Although one example of gain values has been provided, other configurations are possible.

**[0046]** The first to third LNAs 61a-61c can provide low noise amplification for the first to third amplification paths 51-53, respectively. In certain implementations, the first to third LNAs 61a-61c can be used to amplify signals having a relatively small amplitude while adding or introducing a relatively small amount of noise. For example, in one embodiment, each of the LNAs 61a-61c has a noise figure of 1 dB or less. However, other configurations are possible.

**[0047]** The first to third band-pass filters 62a-62c include inputs electrically coupled to outputs of the first to third LNAs 61a-61c, respectively. The first to third band-pass filters 62a-62c can filter the frequency content of the amplified signals generated by the first to third LNAs 61a-61c, respectively. In certain embodiments, the first to third band-pass filters 62a-62c can be analog filters with fixed filtering characteristics and/or low costs, such as ceramic or SAW filters. However, other configurations are possible. Additional details of the first to third band-pass filters 62a-62c will be described further below.

**[0048]** The first to third attenuators 63a-63c can be used to attenuate the filtered signals generated by the first to third band-pass filters 62a-62c, respectively. The first to third attenuators 63a-63c can be used to limit a gain of the first to third amplification paths 51-53, respectively. For example, it can be desirable to provide attenuation in one or more of the first to third amplification paths 51-53, such as in configurations in which one or more of the input signals to the amplification paths has a relatively large amplitude, which can occur when the signal booster 50 is positioned relatively close to a base station. In one embodiment, the attenuation of the first to third attenuators 63a-63c can be controlled using one or more processing or control units. For example, one or more embedded CPUs can be used to provide gain control, such as programmable gain control. In certain implementations, the first to third attenuators 63a-63c can be implemented using analog attenuation

components. However, other configurations are possible, such as implementations using digital attenuators, such as digital step attenuators.

**[0049]** The first to third PAs 64a-64c can be used to amplify the attenuated signals generated by the first to third attenuators 63a-63c, respectively. The first to third PAs 64a-64c can be used to generate amplified RF output signals that have a magnitude suitable for transmission via an antenna. The first to third PAs 64a-64c can be implemented using single or multi-stage configurations, including, for example, multi-stage configurations using automatic gain control (AGC).

**[0050]** The control circuit 54 can be used to control the operation of the circuitry of the signal booster 50. For example, in certain implementations, the control circuit 54 can be used to control the level of attenuation of the first to third attenuators 63a-63c, an amount of gain of the first to third PAs 64a-64c and/or the first to third LNAs 61a-61c, and/or to provide other control operations in signal booster 50. For clarity of the figures, connections and control signals generated by the control circuit 54 have been omitted. Additionally, although not illustrated in Figure 3, the signal booster 50 can include additional circuitry such as directional couplers, which can aid the control circuit 54 in controlling output power levels of the first to third amplification paths 51-53. Accordingly, in certain implementations the control circuit 54 can operate to provide automatic gain control (AGC). The control circuit 54 can also operate to provide other functionality, including, for example, automatic oscillation detection and/or automatic shutdown to prevent interference with base stations.

**[0051]** The first and second multiplexers 55a, 55b can be used to provide multiplexing between the first to third amplification paths 51-53 and the first and second antennas 5a, 5b, respectively. For example, the first multiplexer 55a can be used to combine the amplified output signals from the first and second amplification paths 51, 52 for transmission via the first antenna 5a, and to filter a receive signal received on the first antenna 5a to provide an input signal to the third amplification path 53. Additionally, the second multiplexer 55b can be used to provide the amplified output signal from the third amplification path 53 to the second antenna 5b, and to filter a receive signal received on the second antenna 5b to provide appropriate input signals to the first and second amplification paths 51, 52.

**[0052]** In certain implementations, the first multiplexer 55a can include a band-pass filter associated with each of the multiplexer's first to third terminals. Additionally, the second multiplexer 55b can include a band-pass filter associated with each of the multiplexer's first to third terminals. The band-pass filter associated with a particular terminal can be configured to pass frequencies corresponding to those of an associated amplification path that is connected to the terminal. For example, in certain configurations, the band-pass filters of the multiplexers 55a, 55b have a passband similar to that of a corresponding one of the band-pass filters 62a-62c of the amplification paths 51-53. One example of a suitable implementation of the first and second multiplexers 55a, 55b can be similar to that described below with respect to Figure 5A.

**[0053]** Furthermore, in certain implementations, one or both of the first and second multiplexers 55a, 55b can be omitted. For example, in one embodiment, the signal booster 50 omits the first and second multiplexers 55a, 55b in favor of using a separate antenna at the input and output of each of the amplification paths 51-53.

**[0054]** The signal booster 50 can be used to boost the uplink and downlink channels of first and second frequency bands that are adjacent or closely positioned in frequency, such as when adjacent frequency bands have a duplex that is reversed. For example, in one embodiment, the signal booster 50 is used to boost Band XII and Band XIII, which are adjacent in frequency and have uplink and downlink channels that are flipped or reversed in frequency such that the Band XII downlink channel and the Band XIII downlink channel are positioned between the Band XII uplink channel and the Band XIII uplink channel. For example, the Band XII downlink channel can have a greater frequency than the Band XII uplink channel, and the Band XIII uplink channel can have a greater frequency than the Band XIII downlink channel.

**[0055]** Additionally, the signal booster 50 includes the first and second amplification paths 51, 52, which can be used to amplify the uplink channels of the first and second bands. Furthermore, the signal booster 50 includes the third amplification path 53, which operates as a shared amplification path that boosts both the downlink channel of the first frequency band and the downlink channel of the second frequency band. Thus, in contrast to a conventional signal booster that includes a separate amplification path for each

frequency channel that is boosted, the illustrated configuration includes a shared amplification path for amplifying adjacent downlink channels, such as close or abutting downlink channels.

**[0056]** To provide suitable channel filtering, the first band-pass filter 62a can pass the first frequency band's uplink channel and attenuate the first frequency band's downlink channel. Additionally, second band-pass filter 62b can pass the second frequency band's uplink channel and attenuate the second frequency band's downlink channel. Furthermore, the third band-pass filter 62c can pass the downlink channels of both the first and second frequency bands and attenuate the uplink channels of both the first and second frequency bands. Thus, the third amplification path 53 is shared between the downlink channels of the first and second frequency bands and operates to simultaneously boost or repeat the downlink channels. Since the third amplification path 53 boosts the downlink channels of both the first and second frequency bands, relatively sharp filters need not be used to separately filter these channels. Thus, the first to third band-pass filters 62a-62c can be implemented using filters having a relatively low cost and/or a relatively small size, such as surface acoustic wave (SAW) and/or ceramic filters.

**[0057]** Although the signal booster 50 has been described in the context of a single amplification path boosting multiple downlink channels, the teachings herein are applicable to configurations in which a single amplification path is used to boost multiple uplink channels. For example, the teachings herein are applicable to configurations in which a shared amplification path is used to boost the uplink channels of two frequency bands that are adjacent, such as when the duplex of the first and second frequency bands is reversed such that the bands' uplink channels are positioned between the bands' downlink channels.

**[0058]** In one embodiment, the adjacent uplink channels or the adjacent downlink channels of the first and second frequency bands are separated in frequency by less than about 10 MHz. Furthermore, in certain implementations, the adjacent uplink channels or the adjacent downlink channels of the first and second frequency bands are abutting, such that there is substantially no separation or gap (e.g., about 0 MHz) between the channel frequencies.



**[0059]** Although one implementation of a signal booster is illustrated in Figure 3, other configurations are possible. For example, the signal booster can include more or fewer amplification paths. Additionally, one or more of the amplification paths can be modified to include more or fewer components and/or a different arrangement of components. For example, in certain implementations, the order of a band-pass filter and an attenuator can be reversed in a cascade, the band-pass filters can be positioned before the LNAs in one or more of the cascades, and/or additional components can be inserted in the cascade.

**[0060]** Figure 4 is a schematic diagram of a signal booster 100 for uplink and downlink channels for five bands according to another embodiment. The signal booster 100 includes the control circuit 54, first to fourth multiplexers 112a-112d, first and second diplexers 111a, 111b, and first to ninth amplification paths or circuits 101-109. The signal booster 100 is electrically coupled to the first and second antennas 5a, 5b.

**[0061]** The first diplexer 111a includes an antenna terminal electrically connected to the first antenna 5a, a first terminal electrically connected to an antenna terminal of the first multiplexer 112a, and a second terminal electrically connected to an antenna terminal of the third multiplexer 112c. The second diplexer 111b includes an antenna terminal electrically connected to the second antenna 5b, a first terminal electrically connected to an antenna terminal of the second multiplexer 112b, and a second terminal electrically connected to an antenna terminal of the fourth multiplexer 112d.

**[0062]** The first multiplexer 112a further includes a first terminal electrically connected to an output of the first amplification path 101, a second terminal electrically connected to an output of the second amplification path 102, a third terminal electrically connected to an input of the third amplification path 103, a fourth terminal electrically connected to an output of the fourth amplification path 104, and a fifth terminal electrically connected to an input of the fifth amplification path 105. The second multiplexer 112b further includes a first terminal electrically connected to an input of the first amplification path 101, a second terminal electrically connected to an input of the second amplification path 102, a third terminal electrically connected to an output of the third amplification path 103, a fourth terminal electrically connected to an input of the fourth amplification

path 104, and a fifth terminal electrically connected to an output of the fifth amplification path 105.

**[0063]** The third multiplexer 112c includes a first terminal electrically connected to an input of the sixth amplification path 106, a second terminal electrically connected to an output of the seventh amplification path 107, a third terminal electrically connected to an input of the eighth amplification path 108, and a fourth terminal electrically connected to an output of the ninth amplification path 109. The fourth multiplexer 112d includes a first terminal electrically connected to an output of the sixth amplification path 106, a second terminal electrically connected to an input of the seventh amplification path 107, a third terminal electrically connected to an output of the eighth amplification path 108, and a fourth terminal electrically connected to an input of the ninth amplification path 109.

**[0064]** In the illustrated configuration, the first amplification path 101 can provide boosting to a Band XII uplink channel, and the second amplification path 102 can provide boosting to a Band XIII uplink channel. Furthermore, the third amplification path 103 can provide boosting to both the Band XII and Band XIII downlink channels. Additionally, the fourth amplification path 104 can provide boosting to the Band V uplink channel, and the fifth amplification path 105 can provide boosting to the Band V downlink channel. Furthermore, the sixth amplification path 106 can provide boosting to the Band IV downlink channel, and the seventh amplification path 107 can provide boosting to the Band IV uplink channel. Additionally, the eighth amplification path 108 can provide boosting to the Band II downlink channel, and the ninth amplification path 109 can provide boosting to the Band II uplink channel.

**[0065]** The first and second multiplexers 112a, 112b can provide multiplexing operations for the first to fifth amplification paths 101-105. The first and second multiplexers 112a, 112b can include a band-pass filter for each of the multiplexers' first to fifth terminals. The band-pass filters can have passbands positioned at frequencies corresponding to the uplink or downlink channels of an associated amplification path. Additionally, the third and fourth multiplexers 112c, 112d can provide multiplexing operations for the sixth to ninth amplification paths 106-109. The third and fourth multiplexers 112c, 112d can include a band-pass filter for each of the multiplexers' first to

fourth terminals. The band-pass filters can have passbands positioned at frequencies corresponding to the uplink or downlink channels of an associated amplification path.

**[0066]** The first diplexer 111a can be used to combine/split signals from/to the antenna terminals of the first and third multiplexers 112a, 112c, and can provide the combined signal to the first antenna 5a. Additionally, the second diplexer 111b can be used to combine/split signals on the antenna terminals of the second and fourth multiplexers 112b, 112d, and can provide the combined signal to the second antenna 5b. Including the first and second diplexers 111a, 111b in the signal booster 100 can aid the signal booster 100 in operating over disjoint frequency bands by combining signals separated by a relatively large frequency difference. For example, in the illustrated configuration, the first and second diplexers 111a, 111b have been used in combination with the multiplexers 112a-112d to multiplex Band XII, Band XIII, and Band V signals with Band II and Band IV signals.

**[0067]** The first to ninth amplification paths 101-109 include different combinations of components, such as amplifiers, attenuators, and band-pass filters, selected to achieve an overall amplification characteristic desirable for a particular band.

**[0068]** In the illustrated configuration, the first amplification path 101 includes a cascade of an LNA 121a, a first band-pass filter 122a, a power level control block or circuit 123a, a first intermediate amplifier or gain block 124a, a second band-pass filter 125a, an attenuator 126a, a second gain block 127a, a third band-pass filter 128a, a third gain block 129a, a fourth band-pass filter 130a, and a power amplifier 132a. Additionally, the second amplification path 102 includes a cascade of an LNA 121b, a first band-pass filter 122b, a power level control block 123b, a first gain block 124b, an attenuator 126b, a second band-pass filter 125b, a second gain block 127b, a third band-pass filter 128b, a third gain block 129b, a fourth band-pass filter 130b, and a power amplifier 132b. Furthermore, the third amplification path 103 includes a cascade of an LNA 121c, a power level control block 123c, a first band-pass filter 122c, a first gain block 124c, an attenuator 126c, a second gain block 127c, a second band-pass filter 125c, a third gain block 129c, a fourth gain block 131c, a third band-pass filter 128c, and a power amplifier 132c. Additionally, the fourth amplification path 104 includes a cascade of an LNA 121d, a first band-pass filter 122d, a power level control block 123d, a first gain block 124d, a second band-pass filter 125d, an

attenuator 126d, a second gain block 127d, a third band-pass filter 128d, a third gain block 129d, and a power amplifier 132d. Furthermore, the fifth amplification path 105 includes a cascade of an LNA 121e, a first band-pass filter 122e, a power level control block 123e, a first gain block 124e, a second band-pass filter 125e, an attenuator 126e, a second gain block 127e, a third band-pass filter 128e, a third gain block 129e, and a power amplifier 132e.

**[0069]** Additionally, in the illustrated configuration, the sixth amplification path 106 includes a cascade of an LNA 121f, a first band-pass filter 122f, a power level control block 123f, a first gain block 124f, a second band-pass filter 125f, an attenuator 126f, a third band-pass filter 128f, a second gain block 127f, a fourth band-pass filter 130f, a third gain block 129d, and a power amplifier 132f. Furthermore, the seventh amplification path 107 includes a cascade of an LNA 121g, a first band-pass filter 122g, a power level control block 123g, a first gain block 124g, a second band-pass filter 125g, an attenuator 126g, a second gain block 127g, a third band-pass filter 128g, a third gain block 129g, a fourth band-pass filter 130g, a fourth gain block 131g, and a power amplifier 132g. Additionally, the eighth amplification path 108 includes a cascade of an LNA 121h, a first band-pass filter 122h, a power level control block 123h, a first gain block 124h, a second band-pass filter 125h, an attenuator 126h, a third band-pass filter 128h, a second gain block 127h, a fourth band-pass filter 130h, a third gain block 129h, and a power amplifier 132h. Furthermore, the ninth amplification path 109 includes a cascade of an LNA 121i, a first band-pass filter 122i, a power level control block 123i, a first gain block 124i, an attenuator 126i, a second band-pass filter 125i, a second gain block 127i, a third band-pass filter 128i, a third gain block 129i, and a power amplifier 132i.

**[0070]** The signal booster 100 of Figure 4 is similar to the signal booster 50 of Figure 3, except that the signal booster 100 of Figure 4 has been expanded to provide boosting to five frequency bands and has been adapted to include additional filters, amplifiers and other circuitry, such as additional components in cascades associated with the amplification paths. In the illustrated configuration, each of the amplification paths 101-109 includes an LNA, a power amplifier, an attenuator, and at least one band-pass filter. Additionally, as shown in Figure 4, the connection between the amplifications paths 101-109

and the antennas 5a, 5b through the multiplexers 112a-112d and the diplexers 111a, 111b can be symmetric. For example, in the illustrated configuration, each of the amplification paths 101-109 is coupled to the antennas 5a, 5b through one multiplexer and one diplexer. Configuring the signal booster 100 in this manner can provide balance between the amplification paths, which can reduce overall noise. Although configuring the signal booster 100 to be symmetric can reduce noise, other implementations are possible, including, for example, asymmetric configurations.

**[0071]** As shown in Figure 4, a type, number, and/or order of the components in an amplification path can be selected to provide a desired amplification characteristic for a particular frequency channel. For example, a number of gain blocks can be selected to achieve a desired amplification characteristic depending upon the band and channel(s) being amplified, while a number of pass-band filters can be selected to achieve a desired filtering characteristic for the channel(s).

**[0072]** In certain configurations, the power level control blocks 123a-123i are included to adjust the gain of the first to ninth amplification paths 101-109, respectively. For example, in certain implementations, the power level control blocks 123a-123i can be used to adjust or limit the gain when the gain of an associated amplification path exceeds a maximum power threshold level. However, in other configurations, one or more of the power level control blocks 123a-123i can be omitted.

**[0073]** In the illustrated configuration, the signal booster 100 includes the third amplification path 103, which has been configured to boost both a Band XII downlink channel and a Band XIII downlink channel. The third amplification path 103 includes first to third band-pass filters 122c, 125c, 128c, each of which can have a passband configured to pass both the Band XII and Band XIII downlink channels while attenuating other frequency components. Thus, in contrast to the signal booster 50 of Figure 3 which includes one band-pass filter 62b in the third amplification path 53, the signal booster 100 illustrates a configuration using three band-pass filters 122c, 125c, 128c in the third amplification path 103. Using a plurality of band-pass filters in an amplification path can increase a strength or degree of filtering. For example, cascading multiple band-pass filters can be

useful in high gain configurations, in which an amplification path has a relatively large amount of gain.

**[0074]** Although Figure 4 illustrates one example of a signal booster in accordance with the teachings herein, other configurations are possible. For example, the teachings herein are applicable to configurations in which the signal booster 100 boosts more or fewer bands, or a different combination of bands.

**[0075]** Figure 5A is a schematic diagram of a multiplexer 150 according to one embodiment. The multiplexer 150 includes a first terminal 151, a second terminal 152, a third terminal 153, an antenna terminal 156, a combiner 159, a first band-pass filter 161, a second band-pass filter 162, and a third band-pass filter 163. The first band-pass filter 161 is electrically connected between the first terminal 151 and the antenna terminal 156 through the combiner 159. Additionally, the second band-pass filter 162 is electrically connected between the second terminal 152 and the antenna terminal 156 through the combiner 159. Furthermore, the third band-pass filter 163 is electrically connected between the third terminal 153 and the antenna terminal 156 through the combiner 159. The combiner 159 can be used to enhance performance by combining RF signals associated with the band-pass filters 161-163 while helping to control characteristic impedance so as to reduce or prevent signal reflections. However, in certain configurations, the combiner 159 can be omitted.

**[0076]** Although Figure 5A illustrates the multiplexer 150 as including certain terminals and components, the multiplexer 150 can be adapted to include additional structures, such as additional components cascaded with the band-pass filters 161-163 and/or additional terminals associated with other frequency channels. In certain embodiments, the first to third band-pass filters 161-163 can be analog filters with fixed filtering characteristics and/or low cost, such as ceramic or SAW filters. However, other configurations are possible.

**[0077]** In one embodiment, the multiplexer 150 is used in a signal booster that boosts at least the uplink and downlink channels of first and second frequency bands, which have downlink channels that are adjacent, such as when the first and second frequency bands are duplex reversed such that the bands' downlink channels are positioned between the bands' uplink channels. Additionally, the first band-pass filter 161 can pass an uplink channel of the first frequency band and can attenuate the downlink channel of the first

frequency band. Furthermore, the second band-pass filter 162 can pass an uplink channel of the second frequency band and can attenuate the downlink channel of the second frequency band. Furthermore, the third band-pass filter 163 can pass the downlink channels of both the first and second frequency bands and can attenuate the uplink channels of both the first and second frequency bands. Additional details of the multiplexer 150 can be similar to those described earlier.

**[0078]** Although one embodiment of a multiplexer has been described, other configurations are possible. For example, the teachings herein are applicable to multiplexer configurations used in a signal booster that boosts at least the uplink and downlink channels of first and second frequency bands, which are duplex reversed such that the bands' uplink channels are positioned between the bands' downlink channels. In such a configuration, the third band-pass filter 163 can pass the uplink channels of both the first and second frequency bands and can attenuate the downlink channels of both the first and second frequency bands.

**[0079]** Figure 5B is a schematic diagram of a multiplexer 170 according to one embodiment. The multiplexer 170 includes a first terminal 151, a second terminal 152, a third terminal 153, a fourth terminal 154, a fifth terminal 155, an antenna terminal 156, a combiner 159, a first band-pass filter 161, a second band-pass filter 162, a third band-pass filter 163, a fourth band-pass filter 164, and a fifth band-pass filter 165.

**[0080]** The multiplexer 170 of Figure 5B is similar to the multiplexer 150 of Figure 5A, except that the multiplexer 170 further includes the fourth and fifth terminals 154, 155 and the fourth and fifth band-pass filters 164, 165. In one embodiment, the fourth terminal 154 and the fifth terminal 155 are configured to operate over an uplink channel of a third frequency band and a downlink channel of the third frequency band, respectively. Additionally, the fourth band-pass filter 164 can pass the uplink channel of the third frequency band while attenuating other frequency components. Furthermore, the fifth band-pass filter 165 can pass the downlink channel of the third frequency and while attenuating other frequency components.

**[0081]** Although two example multiplexer configurations are shown in Figures 5A and 5B, the teachings herein are applicable to other configurations, including, for example, multiplexers including additional terminals and/or components. Accordingly, the

teachings herein are not only applicable to multiplexers that multiplex two or three frequency bands, but also to other configurations, such as multiplexers that multiplex four or more bands. Additionally, the teachings herein are also applicable to multi-stage multiplexers including a plurality of multiplexer stages and/or configurations using multiple stages of filtering, including low-pass, high-pass and/or band-pass filtering. Furthermore, the multiplexer 150 of Figure 5A and/or the multiplexer 170 of Figure 5B can be used in a variety of signal boosters, and are not just limited for use in the signal boosters shown in Figures 3 and 4. For example, since the multiplexer 50 and the multiplexer 70 provide band-pass filtering, the multiplexers of Figures 5A and 5B can be used in configurations of signal boosters that do not include any band-pass filters in the signal booster's amplification paths, or in configurations in which only some of the signal booster's amplification paths include band-pass filters.

**[0082]** Figures 6A-6D illustrate various views of a signal booster 200 according to one embodiment. The signal booster 200 includes a housing 201, first and second antenna ports 203a, 203b, top and bottom covers 207, 208, a first printed circuit board (PCB) 211, and a second PCB 212.

**[0083]** Figure 6A is a perspective view of a signal booster 200. Figure 6B is a top plan view of the signal booster 200 of Figure 6A with the top cover 207 removed and with the first metal layer 222a removed. Figure 6C is a bottom plan view of the signal booster 200 of Figure 6A with the bottom cover 207b removed and with a portion of the second metal layer 222b removed. Figure 6D is a cross-section of the signal booster 200 of Figures 6A-6C taken along the lines 6D-6D.

**[0084]** The housing 201 of the signal booster 200 can be used to house the first and second PCBs 211, 212 and/or other circuitry or components of the signal booster 200. The housing 201 can have a variety of form factors. In the illustrated configuration, the housing 201 includes a first side portion 201a, a second side portion 201b, a third side portion 201c, a fourth side portion 201d, and a shielding or middle portion 201e. In the configuration shown in Figures 6A-6D, the first to fourth side portions 201a-201d operate as walls of the signal booster 200, and can have a rectangular perimeter when viewed from above or below. However, other configurations are possible. As shown in Figure 6D, the



shielding portion 201e can extend in a plane substantially perpendicular to the first to fourth side portions 201a-201d, and can contact each of the first to fourth sides 201a-201d. The signal booster 200 can include an upper cavity 205 over the shielding portion 201e and bounded by the first to fourth sides 201a-201d, the shielding portion 201e, and the top cover 207. Additionally, the signal booster 200 can include a lower cavity 206 beneath the shielding portion 201e and bounded by the first to fourth sides 201a-201d, the shielding portion 201e, and the bottom cover 208. The housing 201 can be implemented using a variety of materials, including, for example, metals, such as aluminum. It will be understood that the orientations are relative and the entire signal booster 200 can be placed and held in any desired orientation.

**[0085]** In one embodiment, the housing 201 has a height in the range of about 1 cm to about 10 cm, a width in the range of about 10 cm to about 30 cm, and a length in the range of about 10 cm to about 80 cm. Although one example of dimensional ranges for the housing 201 has been provided, other configurations are possible.

**[0086]** In the illustrated configuration, the first PCB 211 has been positioned in the upper cavity 205, and the second PCB 212 has been positioned in the lower cavity 206. In certain configurations, the first PCB 211 includes circuitry associated with one or more low frequency RF bands, such as RF bands having a frequency less than 1 GHz, and the second PCB 212 includes circuitry associated with one or more high frequency RF bands, such as RF bands having a frequency greater than 1 GHz. For example, in one embodiment, the first PCB 211 includes circuitry for boosting at least one of Band XII, Band XIII, and Band V, and the second PCB 212 includes circuitry for boosting at least one of Band II and Band IV. However, other configurations are possible.

**[0087]** In certain implementations, the first and second PCBs 211, 212 are implemented using different materials suitable for use with the frequency bands for which the circuitry on the PCB provides amplification. For example, in one embodiment, the first PCB 211 is used to amplify one or more low frequency RF bands, such as Band XII, Band XIII, and/or Band V, and is implemented using FR4 board. Additionally, in certain configurations, the second PCB 212 is used to amplify one or more high frequency RF bands, such as Band II and/or Band IV, and is implemented using a laminate board designed for high frequency

circuit use. For example, in one embodiment the second PCB 12 is a laminate including a ceramic filled, glass reinforced, hydrocarbon based insulating material, such as that used in the RO4000® commercially available from Rogers Corporation of Chandler, Arizona. Although the first and second PCBs 211, 212 can be implemented using different materials, the teachings herein are also applicable to configurations in which the PCBs are implemented using the same materials.

**[0088]** Using the first and second PCBs 211, 212 rather than a single PCB can provide a number of advantages, such as allowing the PCBs to be separately tuned or configured for the particular bands for which the PCB provides amplification. Additionally, using two PCBs can ease manufacturing and/or reduce cost in certain configurations. Although the signal booster 200 of Figures 6A-6D is illustrated for a two PCB configuration, the teachings herein are applicable to single PCB configurations or configurations using three or more PCBs.

**[0089]** As shown in Figure 6D, the middle or shielding portion 201e extends between the first and second PCBs 211, 212. Configuring the signal booster 200 in this manner can aid in providing RF shielding or isolation between circuitry on the first and second PCBs 211, 212. For example, when the top and bottom covers 207, 208 are attached to the housing 201, the first and second PCBs 211, 212 can each operate in a Faraday cage or shield formed in part by the shielding portion 201e. The shielding portion 201e can also aid in providing thermal dissipation for the first and second PCBs 211, 212. In one embodiment, the shielding portion 201e has a thickness in the range of about 1 mm to about 40 mm.

**[0090]** Although the illustrated shielding portion 201e is implemented as a part of the housing 201, the teachings herein are applicable to configurations in which the shielding portion is implemented as a separate structure.

**[0091]** In certain implementations, the shielding portion 201e is implemented using one or more heat pipes, such as the heat pipe 213 of Figure 6D. The heat pipe 213 can be used to improve the thermal conductivity of the housing 201 by increasing the dissipation of heat generated by circuitry of the first and/or second PCBs 211, 212. In certain implementations, the heat pipe 213 includes one or more phase change materials. As used

herein, heat pipe refers not only to a tubular heat pipes, but also to planar heat pipes or heat spreaders.

**[0092]** Furthermore, as shown in Figure 6D, the first and second PCBs 211, 222 can be configured to contact the shielding portion 201e to increase heat dissipation. In certain implementations, a side of the first PCB 211 contacting the shielding portion 201e and a side of the second PCB 212 contacting the shielding portion can include soldering metal to enhance heat dissipation. Furthermore, in certain implementations, the first and second PCBs 211, 212 can be firmly secured against the shielding portion 201e, such as by using screws or other fasteners. Additionally, in certain configurations a thermal conductor such as thermal grease can also be used to increase contact thus thermal conductivity, thereby helping to further increase heat transfer from the PCBs to the housing 201.

**[0093]** To aid in removing heat, the housing 200 can include one or more fin structures used to dissipate heat. For example, in the illustrated configuration, the second and fourth side portions 201b, 201d have been implemented to include heat fins 214. The heat fins 214 can be used to dissipate heat, including, for example, heat dissipated through the shielding portion 201e. For example, as shown in Figure 6D, the shielding portion 201e extends substantially parallel to the first and second PCBs 211, 212, which can increase thermal contact. Additionally, the shielding portion 201e contacts the second and fourth sides 201b, 201d, which are substantially perpendicular to the first and second PCBs 211, 212 and include the heat fins 214. It has been found that implementing the heat dissipation structure of the signal booster 200 in this manner can improve overall heat dissipation relative to a configuration in which the shielding portion 201e is omitted and/or in which fins are included only on surfaces that are parallel to the PCBs, such as the top or bottom surfaces of the housing.

**[0094]** Certain structures associated with the first and second PCBs 211, 212 have been labeled in Figures 6B-6D. For example, as shown in Figures 6B and 6D, the upper cavity 205 includes a first isolation structure 221a, a first metal layer 222a (e.g., a foil), first and second multiplexers 225a, 225b, and first to fifth amplification circuits or paths 231-235. Additionally, as shown in Figures 6C and 6D, the lower cavity 206 includes a second

isolation structure 221b, a second metal layer 222b (e.g., a foil), and sixth to ninth amplification paths 236-239.

**[0095]** The first to ninth amplification paths 231-239 can be used to provide boosting to different frequency channels. For example, in one embodiment, the first PCB 211 is configured such that the first amplification path 231 boosts a Band XII uplink channel, the second amplification path 232 boosts a Band XIII uplink channel, the third amplification path 233 boosts both a Band XII downlink channel and a Band XIII downlink channel, the fourth amplification path 234 boosts a Band V uplink channel, and the fifth amplification path 235 boosts a Band V downlink channel. Additionally, in certain configurations, the second PCB 212 is configured such that the sixth amplification path 236 boosts a Band IV downlink channel, the seventh amplification path 237 boosts a Band IV uplink channel, the eighth amplification path 238 boosts a Band II downlink channel, and the ninth amplification path 239 boosts a Band II uplink channel. However, other configurations are possible.

**[0096]** As shown in Figures 6B-6D, the first and second isolation structures 221a, 221b and the first and second metal layers 222a, 222b can operate to provide shielding between or within the first to ninth amplification paths 231-239. Configuring the signal booster 200 to include the first and second isolation structures 221a, 221b and the first and second metal layers 222a, 222b can improve the performance of the signal booster 200 by, for example, reducing interference and/or feedback paths between amplification stages or paths relative to a configuration in which the first and second isolation structures 221a, 221b and the first and second metal layers 222a, 222b are omitted.

**[0097]** The first and second isolation structures 221a, 221b and the first and second metal layers 222a, 222b can also provide isolation for other components of the signal booster 200, including, for example, the first and second multiplexers 225a, 225b of the first PCB 211 as well as multiplexers of the second PCB 212 (not shown in Figures 6A-6D). In certain implementations, first and second isolation structures 221a, 221b and the first and second metal layers 222a, 222b also provide isolation for diplexers, control circuitry, and/or other components of the signal booster 200. In one embodiment, the first and second metal layers 222a, 222b include foil. In certain configurations, the first and second isolation

structures 221a, 221b are implemented using metals, such as aluminum, and can be integrated with the housing 201.

**[0098]** In the illustrated configuration, the first and second PCBs 211, 212 have an orientation that is flipped relative to one another. For example, the first to fifth amplification paths 231-235 of the first PCB 211 are positioned on a side of the first PCB 211 that is opposite the second PCB 212, and the sixth to ninth amplification paths 236-239 of the second PCB 212 are positioned on a side of the second PCB 212 that is opposite the first PCB 211. Configuring the first and second PCBs 211, 212 in this manner can aid in reducing RF interference between the first and second PCBs 211, 212 and in increasing thermal dissipation.

**[0099]** Additionally, configuring the first and second PCBs 211, 212 in this manner can increase the distance between heat sources, such as PAs. For example, the illustrated configuration can have improved thermal performance relative to a configuration in which PAs are positioned in close proximity. Furthermore, in certain implementations the PAs of the first PCB 211 and the PAs of the second PCB 212 are positioned so that they are not aligned with one another with respect to the shielding portion 201e, which can further help in keeping the PAs relatively far away from each other.

**[0100]** The first and second antenna ports 203a, 203b can be used to connect the signal boosters 200 to first and second antennas (not illustrated in Figures 6A-6D), respectively. For example, in certain implementations, the first antenna port 203a can be connected to an outdoor antenna using a first cable, and the second antenna port 203b can be connected to an indoor antenna using a second cable. However, other configurations are possible, such as configurations having additional antenna ports for additional antennas for each or different frequency bands or to support multiple-input multiple-output (MIMO) antennas.

**[0101]** Although not illustrated in Figures 6A-6D, the signal booster 200 can include a variety of other components, including, for example, fasteners, connectors, or adhesives used to assemble the signal booster 200. For example, in one embodiment, the signal booster 200 can include screws for securing the top and bottom covers 207, 208 and/or the first and second PCBs 211, 212 to the housing 201.

**[0102]** Although one example of a signal booster 200 has been described, the teachings herein are applicable to other configurations of signal boosters. For example, the teachings herein are applicable to configurations using a single PCB, and/or to configurations using a housing of a different form factor.

#### Applications

**[0103]** Some of the embodiments described above have provided examples in connection with radio frequency signal boosters. However, the principles and advantages of the embodiments can be used in other suitable systems or apparatus.

#### Conclusion

**[0104]** Unless the context clearly requires otherwise, throughout the description and the claims, the words “comprise,” “comprising,” and the like are to be construed in an inclusive sense, as opposed to an exclusive or exhaustive sense; that is to say, in the sense of “including, but not limited to.” The word “coupled”, as generally used herein, refers to two or more elements that may be either directly connected, or connected by way of one or more intermediate elements. Likewise, the word “connected”, as generally used herein, refers to two or more elements that may be either directly connected, or connected by way of one or more intermediate elements. Additionally, the words “herein,” “above,” “below,” and words of similar import, when used in this application, shall refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description using the singular or plural number may also include the plural or singular number respectively. The word “or” in reference to a list of two or more items, that word covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

**[0105]** Moreover, conditional language used herein, such as, among others, “can,” “could,” “might,” “can,” “e.g.,” “for example,” “such as” and the like, unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or states. Thus, such conditional language is not generally intended to

imply that features, elements and/or states are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without author input or prompting, whether these features, elements and/or states are included or are to be performed in any particular embodiment.

**[0106]** The above detailed description of embodiments of the invention is not intended to be exhaustive or to limit the invention to the precise form disclosed above. While specific embodiments of, and examples for, the invention are described above for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. For example, while processes or blocks are presented in a given order, alternative embodiments may perform routines having steps, or employ systems having blocks, in a different order, and some processes or blocks may be deleted, moved, added, subdivided, combined, and/or modified. Each of these processes or blocks may be implemented in a variety of different ways. Also, while processes or blocks are at times shown as being performed in series, these processes or blocks may instead be performed in parallel, or may be performed at different times.

**[0107]** The teachings of the invention provided herein can be applied to other systems, not only the system described above. The elements and acts of the various embodiments described above can be combined to provide further embodiments.

**[0108]** While certain embodiments of the inventions have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the disclosure. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the methods and systems described herein may be made without departing from the spirit of the disclosure. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the disclosure.

## WHAT IS CLAIMED IS:

## 1. A radio frequency signal booster comprising:

- a housing;

- a first printed circuit board (PCB) positioned within a first cavity of the housing, wherein the first PCB includes a first plurality of amplification paths configured to boost a first plurality of radio frequency bands, wherein the first plurality of radio frequency bands each have a frequency less than about 1 GHz;

- a second PCB positioned within a second cavity of the housing, wherein the second PCB includes a second plurality of amplification paths configured to boost a second plurality of radio frequency bands, wherein the second plurality of radio frequency bands each have a frequency greater than about 1 GHz; and

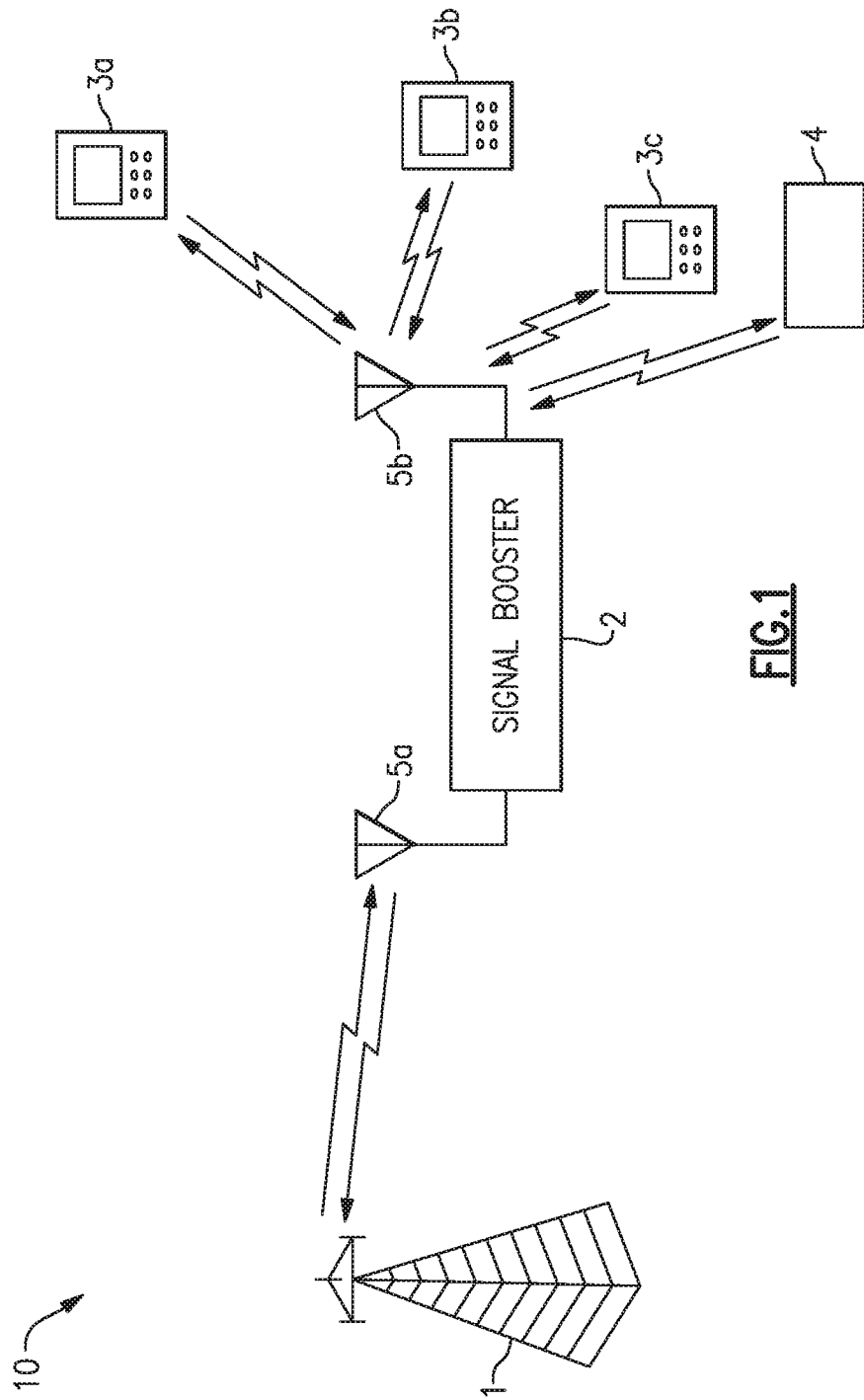
- a shielding structure positioned between the first PCB and the second PCB.

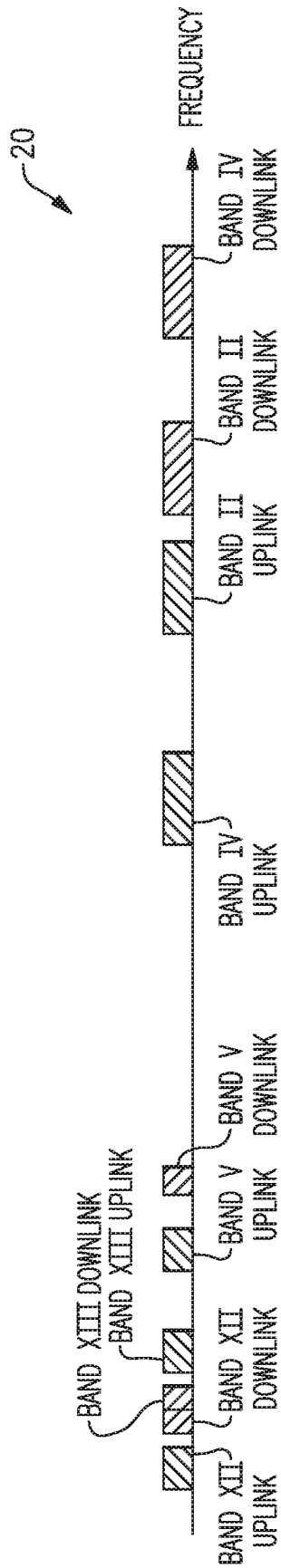


## ABSTRACT OF THE DISCLOSURE

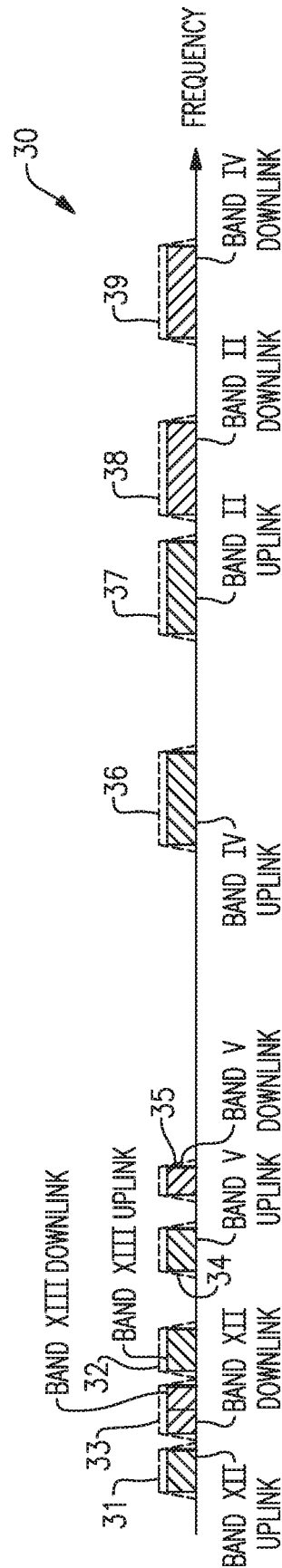
Provided herein are apparatus and methods for radio frequency (RF) signal boosters. In certain implementations, a multi-band signal booster is provided for boosting the uplink and downlink channels of at least a first frequency band and a second frequency band. In certain configurations, the downlink channels of the first and second channels are adjacent, and the signal booster includes a first amplification path for boosting the uplink channel of the first frequency band, a second amplification path for boosting the uplink channel of the second frequency band, and a third amplification path for boosting both downlink channels of the first and second frequency bands.

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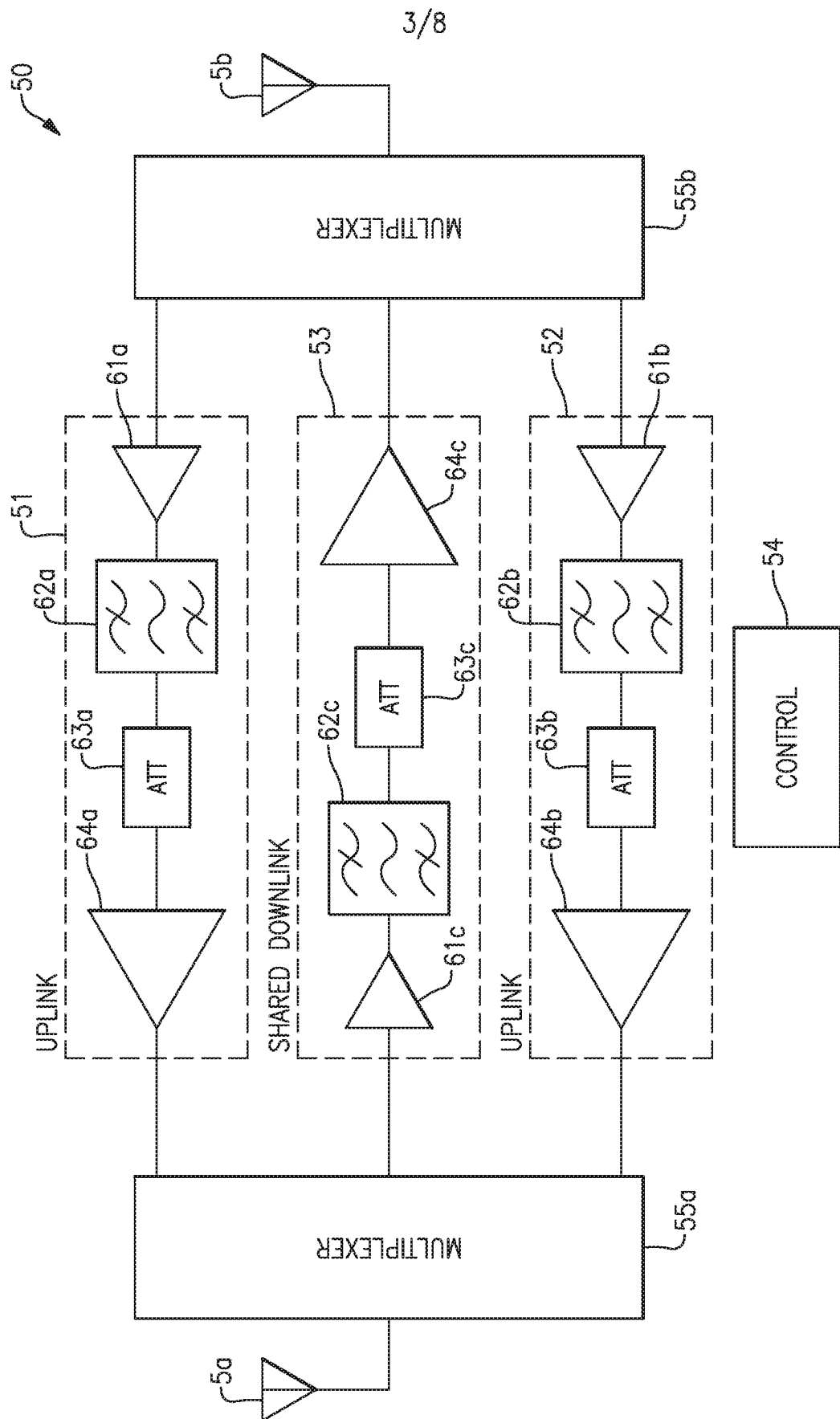




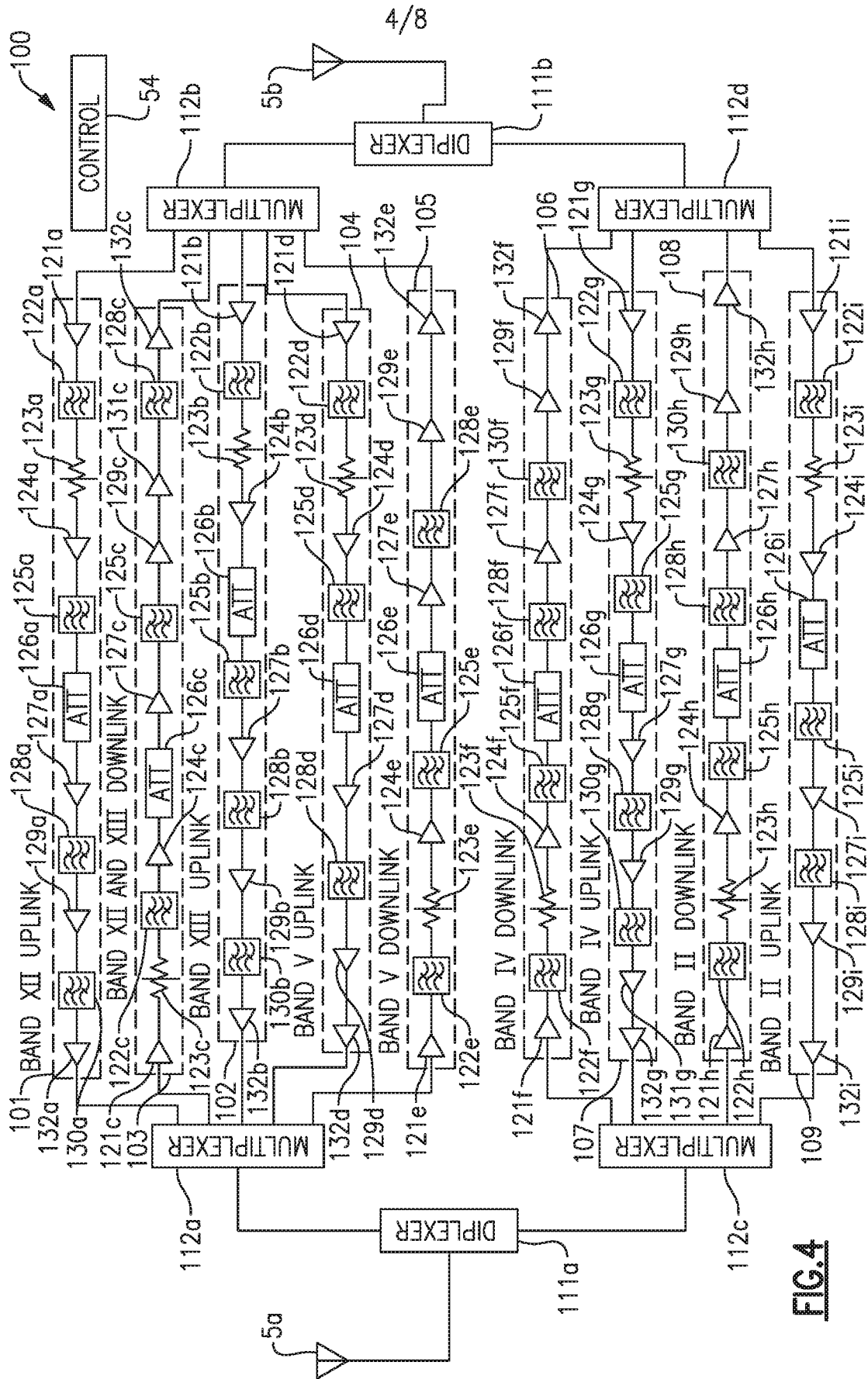
**FIG. 2A**



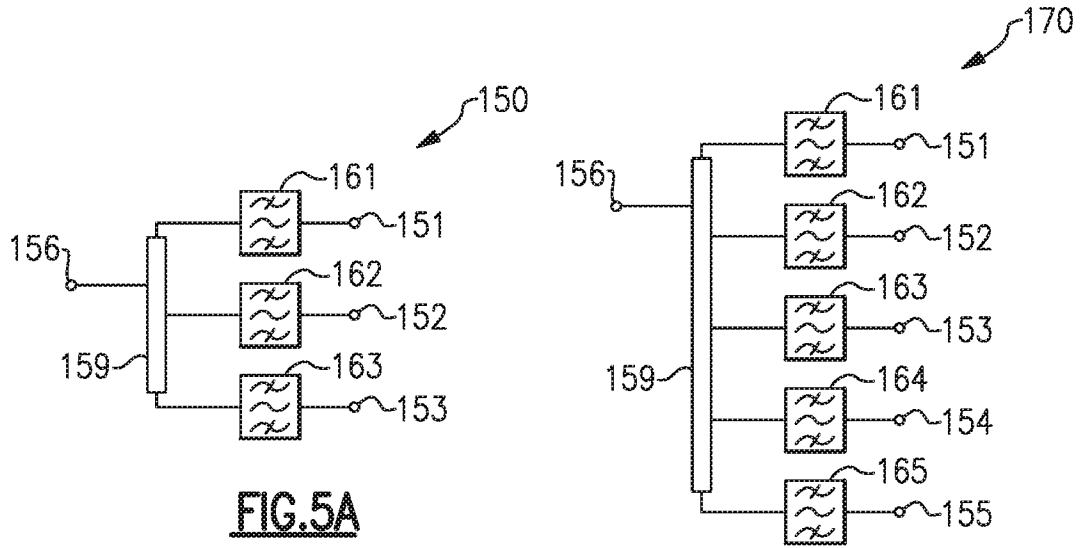
**FIG. 2B**



**FIG. 3**

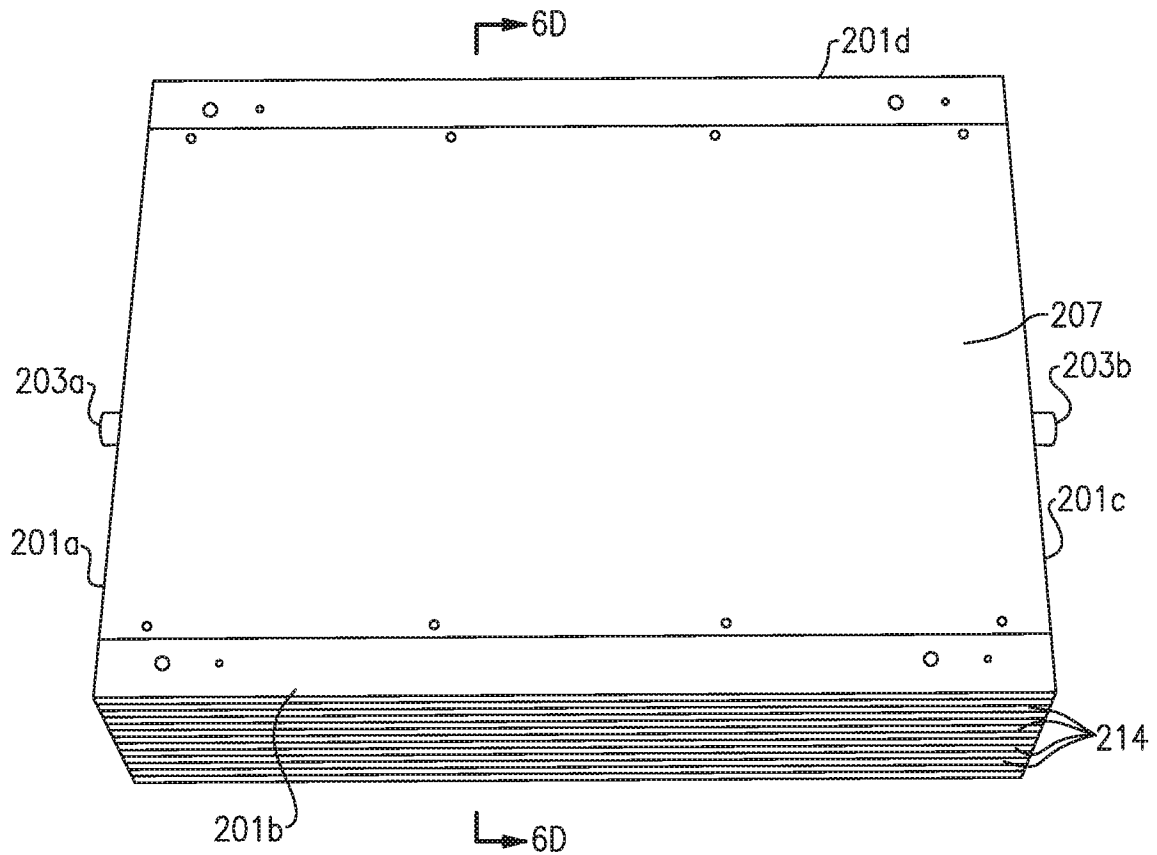


**FIG. 4**

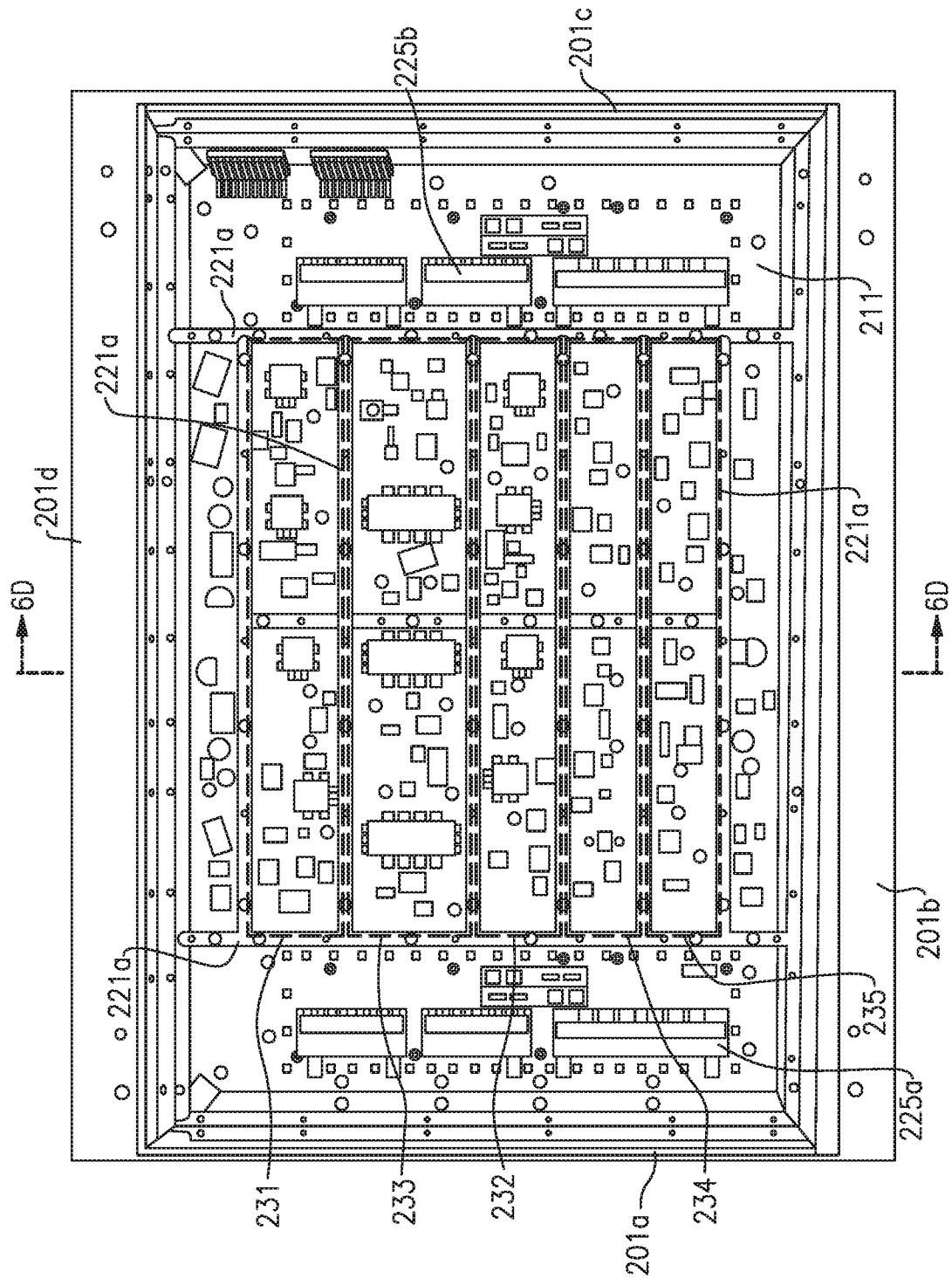


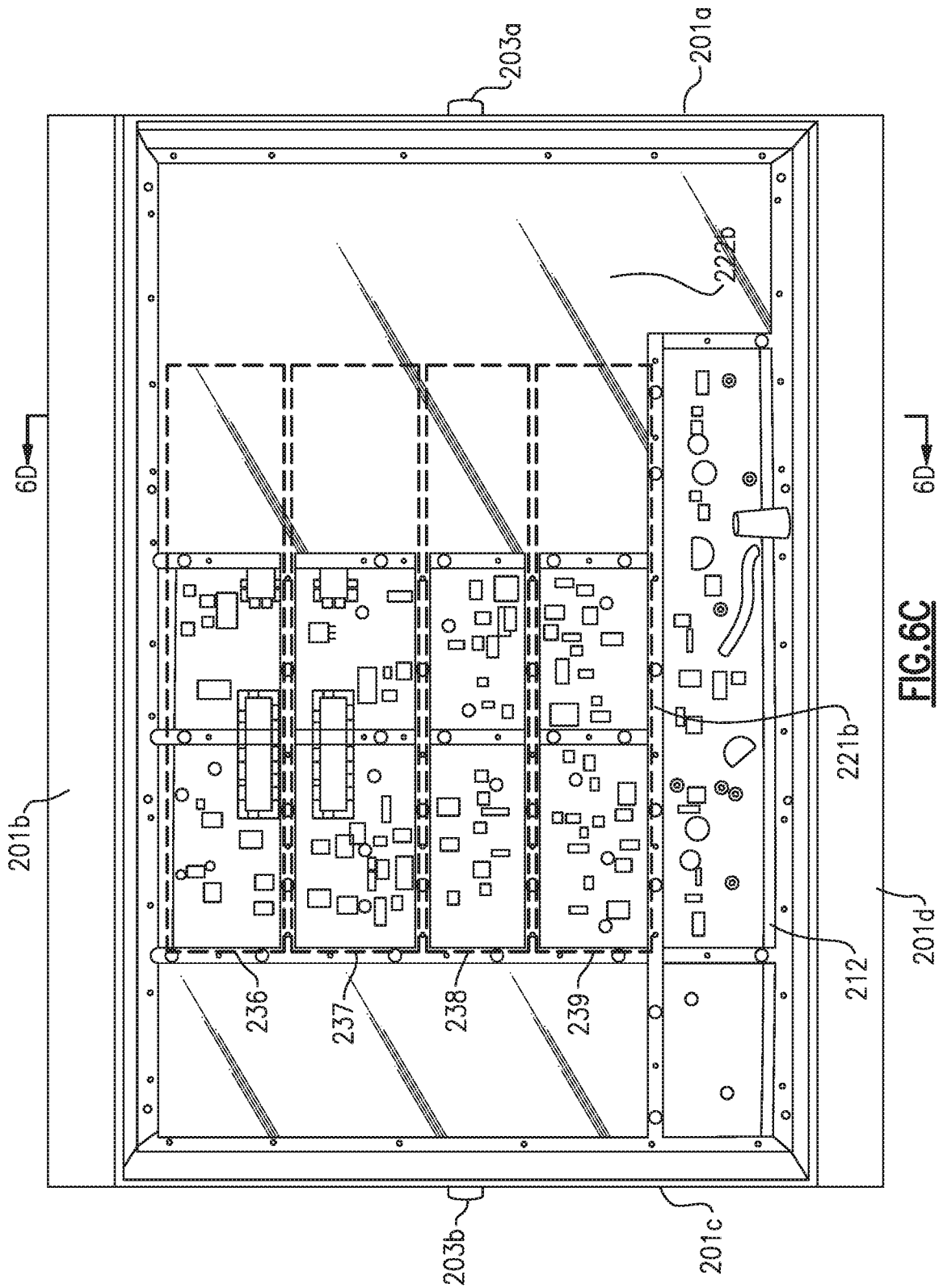
**FIG. 5A**

**FIG. 5B**

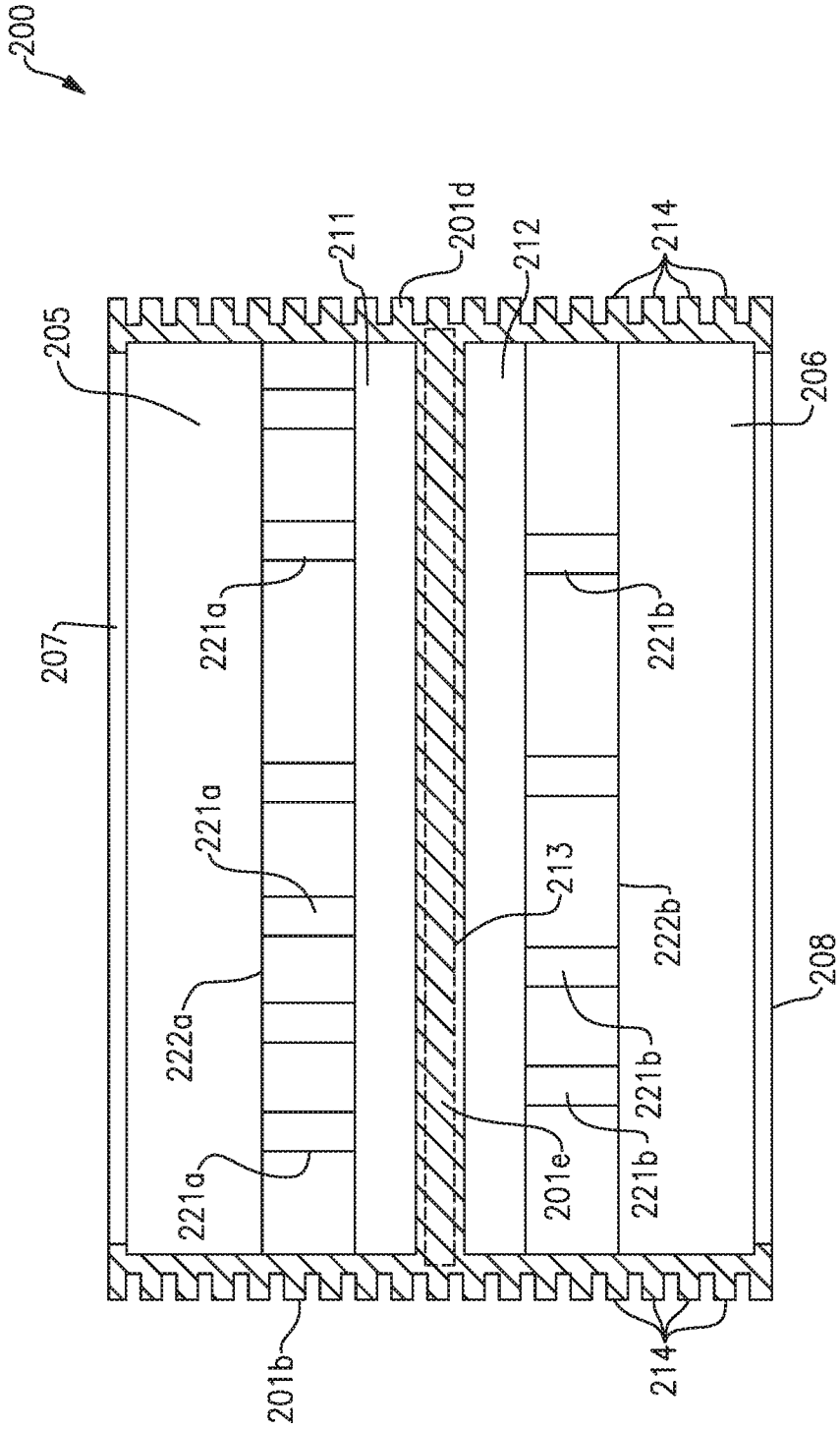


**FIG. 6A**









**D.G.E.**

**COMBINED DECLARATION & ASSIGNMENT (37 CFR 1.63(e))**

*Application Data Sheet filed previously or concurrently*

Docket No.: CELLP.001A

Page 1 of 2

Title: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

Inventors: Hongtao Zhan

***Declaration***

This Declaration is directed to the application identified above that:

Is attached, where "attached" means filed concurrently with.

As a named inventor, I declare that:

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 in the application.

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

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

***Assignment from Inventor***

WHEREAS, the **above-identified inventor** (individual hereinafter "ASSIGNOR") invented certain new and useful improvements, technology, inventions, developments, ideas, ornamental designs, or discoveries, and hereby assign or are under an obligation to assign to the below identified Assignee the above-titled application (collectively hereinafter referred to as the "Work") for which an application for Letters Patent in the United States (identified above) has been prepared for filing with the United States Patent and Trademark Office (hereinafter the "Application").

AND WHEREAS, CELLPHONE-MATE, INC., a California corporation, with its principal place of business at 48346 Milmont Drive, Fremont, CA 94538 (hereinafter the "ASSIGNEE"), desires to acquire the entire right, title, and interest in and to the Application and the Work.

NOW, THEREFORE, for good and valuable consideration of which receipt is hereby acknowledged, ASSIGNOR hereby acknowledges that ASSIGNOR has sold, assigned, transferred and set over, and by these presents does hereby sell, assign, transfer and set over, unto said ASSIGNEE, its successors, legal representatives and assigns, the entire right, title, and interest throughout the world in the Application and the Work, including all patent properties filed or issued upon the Application and the Work; where "Patent Properties" include, but are not limited to:

all provisional applications relating thereto;

all nonprovisional applications claiming priority to aforementioned provisional(s) and/or the present Application, including, all divisions, continuations, continuations-in-part, and reissues, and all Letters Patent of the United States which may be granted thereon and all reissues and extensions thereof; and

all rights of priority under International Conventions and any related Letters Patent which may hereafter be granted or filed in any country or countries foreign to the United States, all extensions, renewals and reissues thereof.

ASSIGNOR hereby acknowledges the ASSIGNEE as the Applicant for all aforementioned patent properties, and authorizes and requests the Commissioner of Patents of the United States, and any Official of any country or countries foreign to the United States, whose duty it is to issue patents on

**COMBINED DECLARATION & ASSIGNMENT (37 CFR 1.63(e))***Application Data Sheet filed previously or concurrently*

Docket No.: CELLP.001A

Page 2 of 2

Title: APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS

Inventors: Hongtao Zhan

applications as aforesaid, to issue all related Letters Patent to the ASSIGNEE, its successors, legal representatives and assigns, in accordance with the terms of this instrument.

AND ASSIGNOR DOES HEREBY sell, assign, transfer, and convey to ASSIGNEE, its successors, legal representatives, and assigns all claims for damages and all remedies arising out of any violation of the rights assigned hereby that may have accrued prior to the date of assignment to ASSIGNEE, or may accrue hereafter, including, but not limited to, the right to sue for, collect, and retain damages for past infringements of said Letters Patent before or after issuance.

AND ASSIGNOR DOES HEREBY covenant and agree that ASSIGNOR will communicate to said ASSIGNEE, its successors, legal representatives and assigns, any facts known to ASSIGNOR respecting the Work, and testify in any legal proceeding, assist in the preparation of any other Patent Property relating to the Application and the Work or any improvements made thereto, sign/execute all lawful papers, execute and make all rightful oaths and/or declarations in connection with the Application and the Work including any improvements made thereto, any patent applications filed therefrom, and any continuing application filed from any of the aforementioned applications, and generally do everything possible to aid the ASSIGNEE, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for the Work in all countries.

Legal Name of inventor: Hongtao Zhan

Signature: \_\_\_\_\_

Witnessed by: \_\_\_\_\_

Witness Name (printed): \_\_\_\_\_

Date: \_\_\_\_\_

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Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		
First Named Inventor/Applicant Name:		Hongtao Zhan		
Filer:		David R. Trossen/Alanna Wai		
Attorney Docket Number:		CELLP.001C3		
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(\$)
<b>Basic Filing:</b>				
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
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>2800</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	24636546
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	Hongtao Zhan
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Melanie Neat
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	15-JAN-2016
<b>Filing Date:</b>	
<b>Time Stamp:</b>	14:48:51
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

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

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	TrackOneRequest_CELLP-001C3.pdf	130098	no	2
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Warnings:					
Information:					
2	Application Data Sheet	ADS_CELLP-001C3.pdf	1823434	no	8
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Warnings:					
Information:					
3		Specfication_CELLP-001C3.pdf	156728	yes	33
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	Specification		1	31	
	Claims		32	32	
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4	Drawings-only black and white line drawings	Figures_CELLP-001C3.pdf	201066	no	8
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<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	2522676
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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor	:	Hongtao Zhan
App. No.	:	14/996,681
Filed	:	January 15, 2016
For	:	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
Examiner	:	Unknown
Art Unit	:	Unknown
Conf. No.	:	4273

**PRELIMINARY AMENDMENT****Mail Stop Amendment**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

Prior to examination on the merits, please amend the above-captioned application as indicated herein.

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

**Remarks** begin on page 8 of this paper.

**AMENDMENTS TO THE CLAIMS**

Please cancel Claim 1. Please add Claims 2-31.

1. (Canceled)

2. (New) A radio frequency signal booster comprising:

a printed circuit board (PCB) comprising:

a shared amplification path configured to provide amplification to at least a portion of a first downlink channel of a first frequency band and to provide amplification to at least a portion of a second downlink channel of a second frequency band, wherein the first frequency band and the second frequency band are different frequency bands,

wherein the shared amplification path comprises a first band-pass filter configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel, wherein the shared amplification path is further configured to simultaneously boost both the at least a portion of the first downlink channel and the at least a portion of the second downlink channel,

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another,

wherein the shared amplification path further comprises at least one amplifier.

3. (New) The radio frequency signal booster of claim 2, wherein the first band-pass filter is further configured to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band.

4. (New) The radio frequency signal booster of claim 2, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

5. (New) The radio frequency signal booster of claim 4,

wherein the first band-pass filter is further configured to pass at least a portion of a Band XII downlink channel having a frequency range of about 728 MHz to about 746 MHz,

wherein the first band-pass filter is further configured to attenuate a Band XII uplink channel having a frequency range of about 698 MHz to about 716 MHz,

wherein the first band-pass filter is further configured to pass at least a portion of a Band XIII downlink channel having a frequency range of about 746 MHz to about 757 MHz,

wherein the first band-pass filter is further configured to attenuate a Band XIII uplink channel having a frequency range of about 776 MHz to about 787 MHz.

6. (New) The radio frequency signal booster of claim 2, wherein the first frequency band comprises a first plurality of sub-bands, wherein the second frequency band comprises a second plurality of sub-bands, wherein the at least a portion of the first downlink channel comprises at least one sub-band of the first plurality of sub-bands, and wherein the at least a portion of the second downlink channel comprises at least one sub-band of the second plurality of sub-bands.

7. (New) The radio frequency signal booster of claim 2, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

8. (New) The radio frequency signal booster of claim 2, wherein the first band-pass filter comprises one of a surface acoustic wave filter or a ceramic filter.

9. (New) The radio frequency signal booster of claim 2,

wherein the shared amplification path further comprises one or more additional band-pass filters, wherein each of the one or more additional band-pass filters are configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel.

10. (New) The radio frequency signal booster of claim 2, wherein the at least one amplifier of the shared amplification path comprises a low noise amplifier (LNA).

11. (New) The radio frequency signal booster of claim 2, wherein the at least one amplifier of the shared amplification path comprises a power amplifier (PA).

12. (New) The radio frequency signal booster of claim 2, wherein the at least one amplifier of the shared amplification path comprises a gain block.

13. (New) The radio frequency signal booster of claim 2, wherein the shared amplification path further comprises at least one digital attenuator.

14. (New) The radio frequency signal booster of claim 2, wherein the shared amplification path further comprises at least one analog attenuator.

15. (New) The radio frequency signal booster of claim 2, further comprising a multiplexer comprising the first band-pass filter.

16. (New) The radio frequency signal booster of claim 15, wherein the multiplexer multiplexes two frequency bands.

17. (New) The radio frequency signal booster of claim 2, further comprising a housing and one or more components, wherein the housing houses the PCB and the one or more components.

18. (New) The radio frequency signal booster of claim 2, wherein a gain of the shared amplification path is externally controllable.

19. (New) The radio frequency signal booster of claim 2, wherein the PCB is configured to provide amplification to a plurality of frequency bands, wherein the plurality of frequency bands comprise Band II, Band IV, Band V, Band XII, and Band XIII.

20. (New) An apparatus comprising:

a printed circuit board (PCB) comprising:

a shared amplification path configured to provide amplification to a first downlink channel of a first frequency band and to provide amplification to a second downlink channel of a second frequency band, wherein the first frequency band and the second frequency band are different frequency bands, wherein the shared amplification path is further configured to simultaneously boost both the first downlink channel and the second downlink channel,

wherein the shared amplification path comprises a first band-pass filter configured to pass both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band, and to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band,

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another,

wherein the shared amplification path further comprises at least one amplifier.

21. (New) The apparatus of claim 20, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

22. (New) The apparatus of claim 20, wherein the at least one amplifier of the shared amplification path comprises a LNA.

23. (New) The apparatus of claim 20, wherein the shared amplification path comprises a PA.

24. (New) The apparatus of claim 20, wherein the shared amplification path further comprises at least one attenuator.

25. (New) The apparatus of claim 20, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

26. (New) The apparatus of claim 20, further comprising a multiplexer comprising the first band-pass filter.

27. (New) The apparatus of claim 26, wherein the multiplexer multiplexes two frequency bands.

28. (New) The apparatus of claim 20, wherein a gain of the shared amplification path is externally controllable.

29. (New) The apparatus of claim 20, wherein the shared amplification path further comprises one or more additional band-pass filters, wherein each of the one or more additional band-pass filters are configured to pass both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band, wherein each of the one or more additional band-pass filters is configured to attenuate both the first uplink channel of the first frequency band and the second uplink channel of the second frequency band.

30. (New) The apparatus of claim 20, wherein the PCB is configured to provide amplification to a plurality of frequency bands, wherein the plurality of frequency bands comprise Band II, Band IV, Band V, Band XII, and Band XIII.

31. (New) A method of boosting radio frequency signals in a signal booster, the method comprising:

providing amplification to a first downlink channel of a first frequency band and to a second downlink channel of a second frequency band using a shared amplification path of the signal booster,

wherein providing amplification comprises simultaneously boosting both the first downlink channel and the second downlink channel using at least one amplifier of the shared amplification path;

passing both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band using a first band-pass filter of the shared amplification path; and

attenuating both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band using the first band-pass filter,

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another.

### **REMARKS**

The present amendments are made to present the claims that Applicant would like to have examined. Claim 1 has been canceled and Claims 2-31 have been added as set forth above.

Support for the amendments to the claims can be found throughout the application as filed, including, for example, in Figures 1-5B and in paragraphs [0024]-[0081] of the specification as filed. Applicant respectfully submits that the amendments are fully supported by the application as originally filed and do not constitute the addition of new matter. As such, Applicant respectfully requests the entry of the amendments.

Applicant believes the Application is in condition for examination on the merits and respectfully requests the same.

#### *No Disclaimers or Disavowals*

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.



**Application No.:** 14/996,681  
**Filing Date:** January 15, 2016

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: January 15, 2016

By: /David Trossen/

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Electronic Patent Application Fee Transmittal				
Application Number:		14996681		
Filing Date:				
Title of Invention:		APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS		
First Named Inventor/Applicant Name:				
Filer:		David R. Trossen/Alanna Wai		
Attorney Docket Number:		CELLP.001C3		
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:				
Claims in excess of 20	2202	10	40	400
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 (\$)				400

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	24638411
<b>Application Number:</b>	14996681
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	4273
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR RADIO FREQUENCY SIGNAL BOOSTERS
<b>First Named Inventor/Applicant Name:</b>	
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Melanie Neat
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	CELLP.001C3
<b>Receipt Date:</b>	15-JAN-2016
<b>Filing Date:</b>	
<b>Time Stamp:</b>	15:36:17
<b>Application Type:</b>	Utility under 35 USC 111(a)

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<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		PA_CELLP-001C3.pdf	43943 8b548dcc1087787e4f4caa89f952835400b221f6	yes	9
	<b>Multipart Description/PDF files in .zip description</b>				
	<b>Document Description</b>		<b>Start</b>	<b>End</b>	
	Preliminary Amendment		1	1	
	Claims		2	7	
	Applicant Arguments/Remarks Made in an Amendment		8	9	
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	30352 218b729463205a0c4590e6a4badbe2fcd09a420b	no	2
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO**APPLICATION AS FILED – PART I**

(Column 1)

(Column 2)

FOR	NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
<input type="checkbox"/> 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 \$ =	
<input type="checkbox"/> 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).				
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

**APPLICATION AS AMENDED – PART II**

(Column 1)

(Column 2)

(Column 3)

	01/15/2016	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	Total (37 CFR 1.16(i))	* 30	Minus	** 30	= 0		X \$40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0		X \$210 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
TOTAL ADD'L FEE								<b>0</b>

(Column 1)

(Column 2)

(Column 3)

		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	Total (37 CFR 1.16(i))	*	Minus	**	=		X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> 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".

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LIE  
/DONNA 1. SMALLS LOGAN/

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