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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351
30743	7590	01/18/2024		
WC&F IP 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			EXAMINER SERAYDARYAN, HELENA H	
			ART UNIT	PAPER NUMBER
			3648	
			MAIL DATE	DELIVERY MODE
			01/18/2024	PAPER

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

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



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APPLICATION NO.	ISSUE DATE	PATENT NO.
17/346,533	16-Jan-2024	11876548

WC&F IP
11491 SUNSET HILLS ROAD
RESTON, VA 20190

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at <https://patentcenter.uspto.gov>

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit <https://www.uspto.gov/electronicgrants>



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	01/16/2024	11876548	08610010C2	5351

30743 7590 12/27/2023
WC&F IP
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at <https://patentcenter.uspto.gov/>. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at <https://certifiedcopycenter.uspto.gov/index.html>. The Certified Copy Center may be reached at (800)972-6382.

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 149 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 Center (<https://patentcenter.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 Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional inventors):

Theodore S. Rappaport, Riner, VA;

APPLICANT(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional applicants):

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.



UNITED STATES
PATENT AND TRADEMARK OFFICE

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #
17/346,533

RECEIPT DATE / TIME
11/30/2023 01:17:45 PM Z ET

ATTORNEY DOCKET #
08610010C2

Title of Invention

Steerable Antenna Device

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 5351

FILED BY WALTER RICHARDSON

PATENT CENTER # 63437370

AUTHORIZED BY Michael Whitham

CUSTOMER # 30743

FILING DATE 06/14/2021

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Theodore S. Rappaport

Payment Information

PAYMENT METHOD
CARD / 6511

PAYMENT TRANSACTION ID
E2023ATD17599567

PAYMENT AUTHORIZED BY
WALTER RICHARDSON

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2501	UTILITY ISSUE FEE	480.00	1	480.00
TOTAL AMOUNT:				\$480.00

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 filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage

submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/346,533

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08610010C2

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Steerable Antenna Device

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under 35 USC 111(a)

PATENT # -

CONFIRMATION # 5351

FILED BY WALTER RICHARDSON

PATENT CENTER # 63437370

FILING DATE 06/14/2021

CUSTOMER # 30743

FIRST NAMED INVENTOR Theodore S. Rappaport

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Michael Whitham

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023-11-30-08610010C2_IFP.pdf	1	Issue Fee Payment (PTO-85B)	121 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2023-11-30-08610010C2_IFP.pdf	91894F4DAFE44FC0EAA1CE224C54907D166A66A3B69684EE7 16C5E91A7CE3D331F9EAA9A2DBB2F20CAE612C1A9AD77459 6A1404F2206F346CE774B9ADB413160

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New International Application Filed with the USPTO as a Receiving Office

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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.

30743 7590 08/30/2023
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RESTON, VA 20190

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351

TITLE OF INVENTION: Steerable Antenna Device

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	11/30/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
SERAYDARYAN, HELENA H	3648	342-372000

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/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or 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 WCF IP
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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

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

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via Patent Center or EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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 /Michael E. Whitham/

Date 2023-11-21

Typed or printed name Michael E. Whitham

Registration No. 32635



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351

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7590 10/03/2023

EXAMINER

SERAYDARYAN, HELENA H

ART UNIT	PAPER NUMBER
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3648

MAIL DATE	DELIVERY MODE
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10/03/2023

PAPER

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed 9.13.2023 in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

☒ The IDS lacks a statement as specified in 37 CFR 1.97(e).

☐ The IDS lacks the fee set forth in 37 CFR 1.17(p).

☐ The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

N. Horne, for

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

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

Application Number	17346533
Filing Date	2021-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	
Examiner Name	
Attorney Docket Number	08610010C2

U.S.PATENTS

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8369796	B2	2013-02-05	Intel Corporation	
	2	7949309	B2	2011-05-24	Broadcom Corporation,	
	3	7834813	B2	2010-11-16	SkyCross, Inc.	
	4	7801556	B2	2010-09-21	QUALCOMM Incorporated	

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² i	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		17346533
Filing Date		2021-06-14
First Named Inventor	Theodore S. Rappaport	
Art Unit		
Examiner Name		
Attorney Docket Number	08610010C2	

	1							☐
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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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1		☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

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

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

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

Application Number	17346533
Filing Date	2021-06-14
First Named Inventor	Theodore S. Rappaport
Art Unit	
Examiner Name	
Attorney Docket Number	08610010C2

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☐ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Michael E. Whitham/	Date (YYYY-MM-DD)	2023-09-13
Name/Print	Michael E. Whitham	Registration Number	32635

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

Privacy Act Statement

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

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

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



ELECTRONIC PAYMENT RECEIPT

APPLICATION #
17/346,533

RECEIPT DATE / TIME
09/13/2023 12:46:02 PM ET

ATTORNEY DOCKET #
08610010C2

Title of Invention

Steerable Antenna Device

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 5351

FILED BY Sam Cook

PATENT CENTER # 62788212

AUTHORIZED BY Michael Whitham

CUSTOMER # 30743

FILING DATE 06/14/2021

CORRESPONDENCE ADDRESS -

FIRST NAMED INVENTOR Theodore S. Rappaport

Payment Information

PAYMENT METHOD
CARD / 6511

PAYMENT TRANSACTION ID
E20239CC48536111

PAYMENT AUTHORIZED BY
Sam Cook

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	104.00	1	104.00
TOTAL AMOUNT:				\$104.00

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.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/346,533

RECEIPT DATE / TIME
09/13/2023 12:46:02 PM ET

ATTORNEY DOCKET #
08610010C2

Title of Invention

Steerable Antenna Device

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 5351

FILED BY Sam Cook

PATENT CENTER # 62788212

FILING DATE 06/14/2021

CUSTOMER # 30743

FIRST NAMED
INVENTOR Theodore S. Rappaport

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Michael Whitham

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023-09-13_08610010C2_IDS01.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1010 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2023-09-13_08610010C2_IDS01.pdf	D30826EA0BDE5C06BD17AE4F92BE240C284170DD3F72B6071 359CCCB24AAF5F677AA0EA62C8E002AB45DB388DB5BF6C2E 420146C8908E6BAA7EBC4423440E986

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 filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

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

New International Application Filed with the USPTO as a Receiving Office

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



UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

30743 7590 08/30/2023
WC&F IP
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

EXAMINER	
SERAYDARYAN, HELENA H	
ART UNIT	PAPER NUMBER
3648	

DATE MAILED: 08/30/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351

TITLE OF INVENTION: Steerable Antenna Device

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	11/30/2023

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 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted 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. 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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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.

30743 7590 08/30/2023
WC&F IP
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351

TITLE OF INVENTION: Steerable Antenna Device

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	11/30/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
SERAYDARYAN, HELENA H	3648	342-372000

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/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or 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,

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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

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

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via Patent Center or EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351
30743	7590	08/30/2023	EXAMINER	
WC&F IP 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			SERAYDARYAN, HELENA H	
			ART UNIT	PAPER NUMBER
			3648	

DATE MAILED: 08/30/2023

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 30 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) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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

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

Notice of Allowability	Application No. 17/346,533	Applicant(s) Rappaport, Theodore S.	
	Examiner HELENA H SERAYDARYAN	Art Unit 3648	AIA (FITF) Status No

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

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

1. ☒ This communication is responsive to 06/19/2023.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 1-16. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

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

Certified copies:

a) ☐ All b) ☐ Some* c) ☐ None of the:

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

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

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

* Certified copies not received: _____.

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

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

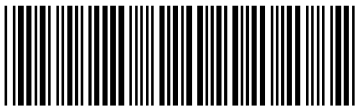
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

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

/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648	/TIMOTHY A BRAINARD/ Primary Examiner, Art Unit 3648
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<i>Search Notes</i> 	Application/Control No. 17/346,533	Applicant(s)/Patent Under Reexamination Rappaport, Theodore S.
	Examiner HELENA H SERAYDARYAN	Art Unit 3648

CPC - Searched*		
Symbol	Date	Examiner
H04B1/3838	11/30/2022	HS
H04B1/3838 (updated)	08/28/2023	HS

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

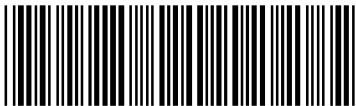
US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor Name Search in PALM	11/30/2022	HS
Inventor Name Search in PE2E search	11/30/2022	HS
Text Search in PE2E	11/30/2022	HS
Updated Text Search	08/28/2023	HS

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
H04B	1/3838	08/28/2023	HS

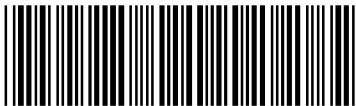
/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648	/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648
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Issue Classification 	Application/Control No. 17/346,533	Applicant(s)/Patent Under Reexamination Rappaport, Theodore S.	
	Examiner HELENA H SERAYDARYAN	Art Unit 3648	

CPC						
Symbol					Type	Version
H04B	/	1	/	3838	F	2013-01-01
H01Q	/	1	/	243	I	2013-01-01
H01Q	/	1	/	245	I	2013-01-01
H04B	/	1	/	0053	I	2013-01-01
H01Q	/	3	/	24	I	2013-01-01
H01Q	/	21	/	28	I	2013-01-01
H01Q	/	5	/	335	I	2013-01-01
H01Q	/	5	/	35	I	2013-01-01
H01Q	/	5	/	357	I	2015-01-15

CPC Combination Sets					
Symbol				Type	Set
	/		/		

/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648 (Assistant Examiner)	28 August 2023 (Date)	Total Claims Allowed: 16	
/TIMOTHY A BRAINARD/ Primary Examiner, Art Unit 3648 (Primary Examiner)	29 August 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Issue Classification</i> 	Application/Control No. 17/346,533	Applicant(s)/Patent Under Reexamination Rappaport, Theodore S.
	Examiner HELENA H SERAYDARYAN	Art Unit 3648

INTERNATIONAL CLASSIFICATION			
CLAIMED			
H04B	/	1	/ 38
NON-CLAIMED			
/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648 (Assistant Examiner)	28 August 2023 (Date)	Total Claims Allowed: 16	
/TIMOTHY A BRAINARD/ Primary Examiner, Art Unit 3648 (Primary Examiner)	29 August 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 17/346,533	Applicant(s)/Patent Under Reexamination Rappaport, Theodore S.
	Examiner HELENA H SERAYDARYAN	Art Unit 3648

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

/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648 (Assistant Examiner)	28 August 2023 (Date)	Total Claims Allowed: 16	
/TIMOTHY A BRAINARD/ Primary Examiner, Art Unit 3648 (Primary Examiner)	29 August 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	104	((Theodore) near2 (Rappaport)).INV.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/04/01 01:02 PM
L2	218	((Theodore) near2 (Rappaport)).INV.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/01 01:02 PM
L3	1	L2 and ((steerable adj antenna) with sensors)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/01 01:04 PM
L4	1748	342/368.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/01 01:04 PM
L5	3044	H01Q1/245.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:44 PM
L6	2704	H04B1/3838.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:44 PM
L7	4870	H01Q3/24.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L8	6373	H01Q3/26.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L9	0	H01Q3/243.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L10	23279	H01Q1/243.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L11	196	steer\$4 with sensor with phone	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:47 PM
L12	1	L11 and Lee.inv.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:47 PM
L13	1	L11 and Lee.in.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:48 PM
L14	36859	L5 or L6 or L7 or L8 or L10	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:49 PM
L15	1	L14 and L11	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:49 PM
L16	775	steer\$4 with sensor with (phone or mobile or cellphone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:49 PM
L17	11	L16 and Lee.in.	(US-PGPUB; USPAT;	AND	ON	ON	2016/04/11

L18	6	L14 and L16	USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	04:50 PM
L19	3	"52780741".FMID.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:50 PM
L20	1533	L14 and Lee.in.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:51 PM
L21	452	L20 and (cellphone or phone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:52 PM
L22	77	L20 and (cellphone or phone)S21 and sensor	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:52 PM
L23	1	L22 and (steer\$4 or redirect\$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:55 PM
L24	73	L22 and (steer\$4 or redirect\$4 or direct\$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:56 PM
L25	1	2014-T60821.NRAN.	(DERWENT)	AND	ON	ON	2016/04/11 04:57 PM
L26	19336	((steer\$4 or redirect\$4 or direct or direction or directionality) with (sensor or camera) with (user or person)) and (phone or mobile or cellphone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:27 PM
L27	41	L14 and L26	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:27 PM
L28	25566	((steer\$4 or redirect\$4 or direct or direction or directionality or pattern) with (sensor or camera) with (user or person)) and (phone or mobile or cellphone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:33 PM
L29	79	L14 and L28	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:34 PM
L30	27	H01Q1/245.cpc. and steer	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:35 PM
L31	277	H01Q1/245.cpc. and sensor	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:49 PM
L32	1058	steer\$4 with antenna with mobile	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/12 09:08 AM

L33	5	"9529117".FMID.	(US-PGPUB; USPAT; FPRS)	AND	ON	ON	2016/04/12 09:34 AM
L34	2	(US-20080242349-\$).did. or (US-6456856-\$).did.	(US-PGPUB; USPAT)	AND	ON	ON	2016/04/12 10:53 AM
L35	40	342/368.ccls. and @pd>"20160506"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/02 04:57 PM
L36	91	H01Q1/245.cpc. and @pd>"20160506"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/02 04:59 PM
L37	13356	(multiple or dual) near2 (frequency adj2 band)	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:45 AM
L38	5187	L37 and GHz	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:45 AM
L39	4852	L38 and communicat\$4	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:46 AM
L40	3177	H01Q1/245.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L41	2962	H04B1/3838.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L42	5154	H01Q3/24.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L43	6655	H01Q3/26.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L44	25291	H01Q1/243.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L45	39574	L40 or L41 or L42 or L43 or L44	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L46	705	L39 and L45	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:48 AM
L47	1	("2013/0328723").URP N.	(USPAT)	AND	ON	ON	2016/11/14 02:56 PM
L48	224	((Theodore) near2 (Rappaport)).INV.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 04:59 PM
L49	89	L48 and GHz and (dual or multiple)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 04:59 PM
L50	29	("2010/0060531").URP N.	(USPAT)	AND	ON	ON	2016/11/15 10:28 AM
L51	34	("2004/0214621").URP N.	(USPAT)	AND	ON	ON	2016/11/15 10:42 AM
L52	38	("2003/0210203").URP N.	(USPAT)	AND	ON	ON	2016/11/15 10:59 AM

L53	21	L52 and GHz	(USPAT)	AND	ON	ON	2016/11/15 10:59 AM
L54	13	("2006/0084395").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:05 AM
L55	13	("2006/0084395").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:05 AM
L56	16	("2009/0011806").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:11 AM
L57	0	("2004/0217909").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:12 AM
L58	0	("2004/0217909").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:12 AM
L59	34	("2004/0214621").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:12 AM
L60	55	("5229975" "5274844" "5541609" "5729238" "5805067" "5924020" "5956626" "5995862").PN. OR ("6456856").URPN.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/15 11:19 AM
L61	4	("2008/0242349").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:27 AM
L62	24	("2008/0018543").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:28 AM
L63	0	("2013/0342416").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:32 AM
L64	4	("2009/0124306").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:33 AM
L65	9	("20070008235" "20080204240" "20130135171" "5983119" "7492254" "8106836").PN. OR ("8649833").URPN.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/15 11:35 AM
L66	3	("2010/0081491").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:38 AM
L67	0	("2008/0150798").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:39 AM
L68	6	("2007/0057843").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:40 AM
L69	46	("4352109" "4518968" "4700194" "4868576" "5257033" "5612705").PN. OR ("6421016").URPN.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/15 11:41 AM
L70	0	(mmv or (milimeter adj wave)) same (multi?band or (multiple adj band) or (dual adj band) or dual-band) same antenna	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:09 AM
L71	7	(mmw or (milimeter adj	(US-PGPUB; USPAT;	AND	ON	ON	2017/06/21

		wave)) same (multi?band or (multiple adj band) or (dual adj band) or dual-band) same antenna	USOCR)				10:09 AM
L72	23	(mmw or (milimeter adj wave)) same2 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same2 antenna	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:10 AM
L73	19	L72 and GHz	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:11 AM
L74	23	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same3 antenna	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:13 AM
L75	23	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same3 antenna	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/06/21 10:13 AM
L76	23	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same3 antenna	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/06/21 10:14 AM
L77	46	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/06/21 10:15 AM
L78	4	("2014/0321282").URP N.	(USPAT)	AND	ON	ON	2017/06/21 10:52 AM
L79	2	US-6556836-\$.did.	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/18 08:04 AM
L80	2	"25301096".FMID.	(US-PGPUB; USPAT; FPRS)	AND	ON	ON	2017/07/18 08:07 AM
L81	4	("2002/0164957").URP N.	(USPAT)	AND	ON	ON	2017/07/18 09:12 AM
L82	4401	(millimeter adj wave) same (cellular or mobile or cellphone or communication)	(USPAT)	AND	ON	ON	2017/07/18 09:34 AM
L83	2827	"l6" and dual	(USPAT)	AND	ON	ON	2017/07/18 09:34 AM
L84	944	L82 and dual	(USPAT)	AND	ON	ON	2017/07/18 09:34 AM

L85	184	((millimeter adj wave) same wireless) and (multiband or (dual adj band))	(USPAT)	AND	ON	ON	2017/07/18 01:54 PM
L86	563	(cellphone or (cellular or mobile) adj phone) and (steerable near2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/18 04:40 PM
L87	563	(cellphone or ((cellular or mobile) adj phone)) and (steerable near2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/18 04:49 PM
L88	2	"40137022".FMID.	(US-PGPUB; USPAT; FPRS)	AND	ON	ON	2017/07/19 11:04 AM
L89	0	H01Q1/245.cpc. and @pd>"20171123"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/19 02:15 PM
L90	0	342/368.ccls. and @pd>"20171123"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/19 02:15 PM
L91	60	H01Q1/245.cpc. and @pd>"20170726"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/11/07 02:24 PM
L92	32	342/368.ccls. and @pd>"20170726"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/11/07 02:24 PM
L93	0	sensor near10 (three adj simensions)	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/04/26 10:06 AM
L94	3994	sensor near10 (three adj dimensions)	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/04/26 10:06 AM
L95	1206	L94 and phone	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/04/26 10:07 AM
L96	0	us-20090295648	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:34 PM
L97	2	us-20090295648-\$.did.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:34 PM
L98	7612629	WO "2012066562"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:41 PM
L99	2	"WO 2012066562"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:41 PM
L100	2	us-20040204027-\$.did.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:43 PM
L101	7620701	WO "2012066562"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/16 10:09 AM
L102	4611	L101 and prasad.inv.	(US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	OFF	OFF	2018/05/16 10:09 AM

L103	9	((Muthukumar) near2 (Prasad)).INV.	DERWENT) (US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/16 10:10 AM
L104	9	L101 and L103	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/16 10:11 AM
L105	7	L102 and SAR and proximity	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/16 10:16 AM
L106	9	((Muthukumar) near2 (Prasad)).INV.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/23 03:46 PM
L107	1	"wo 2012/176217"	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/23 03:47 PM
L108	9	"wo 2012176217"	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/23 03:47 PM
L109	15	"wo 2012176217"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/05/23 03:48 PM
L110	96	H01Q1/245.cpc. and @pd>"20171115"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/05/29 01:08 PM
L111	39	342/368.ccls. and @pd>"20171115"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/05/29 01:09 PM
L112	2	"41379128".FMID.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 07:11 AM
L113	72	("20050090288" "20050124305" "20060161871" "20060205368" "20060232468" "5463406" "5905467" "6285893" "6456856" "6862433" "6959209" "6978121").PN. OR ("8159399").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/06/07 07:11 AM
L114	2	"41379128".FMID.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 07:12 AM
L115	8104	343/702.ccls.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:21 AM
L116	0	342/876.ccls.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L117	952	343/876.ccls.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L118	2324	H01Q1/2266.cpc.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L119	5174	H01Q3/24.cpc.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L120	15520	L115 or L117 or L118 or L119	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM
L121	839	L120 and sensors	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM

L122	812	L121 and antenna	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM
L123	306	L122 and orientation	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM
L124	65	H01Q1/245.cpc. and @pd>"20180614"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/10/22 09:13 AM
L125	24	342/368.ccls. and @pd>"20180614"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/10/22 09:13 AM
L126	683	H01Q1/245.cpc. and @pd>"20181030"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2021/03/10 12:10 PM
L127	63	342/368.ccls. and @pd>"20181030"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2021/03/10 12:10 PM
L135	0	"2013004065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:21 AM
L136	1	"20130004065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:21 AM
L137	1	"20130040065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:21 AM
L138	0	"201304065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:22 AM
L139	0	"2013040065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:22 AM
L140	0	"20013004065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:22 AM
L141	302	Keidar.inv.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:23 AM
L142	1	"20130040655".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:25 AM
L143	2	"7369829".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 08:37 AM
L144	115015748	@pd<="20080814"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:01 AM
L145	1027883	antenna AND (band range) WITH (plurality two several)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU,	OR	ON	ON	2022/11/30 09:02 AM

L146	199944	antenna AND (band range) WITH (plurality two several) WITH (transmitter receiver generat\$4 transceiver)	SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:03 AM
L147	47273	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:04 AM
L148	13342	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:04 AM
L149	1965	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:04 AM
L150	784	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:05 AM
L151	365	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc. AND tun\$4	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:09 AM
L152	1	"11063625".pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:18 AM
L153	67	antenna AND (band range) WITH (plurality two several)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:41 AM

L154	1387306	near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc. AND tun\$4 AND L144	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:07 AM
L155	5795	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:08 AM
L156	3006	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:10 AM
L157	683	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna AND (h01q\$.cpc. OR H04B\$.cpc.)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:11 AM
L158	2421	marks.in. AND game	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:38 AM
		L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:38 AM

L159	5	radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna AND (h01q\$.cpc. OR H04B1/3838.cpc.)					
		L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna AND (	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:38 AM
L160	139	H04B1/3838.cpc.) (((("RAPPAPORT") near3 ("Theodore")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/11/30 10:49 AM
L161	4	"11063625".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/13 04:12 PM
L162	3	"8350763".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/13 04:54 PM
L163	106	H04B1/3838.cpc. AND @pd>"20230221"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2023/08/28 09:34 AM
L164	4	L163 AND (three near2 dimension\$2) AND steer\$4	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2023/08/28 09:39 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N128	867	342/368.ccls.	(USPAT)	AND	ON	ON	2021/03/10 12:12 PM
N129	560	H04B1/3838.cpc.	(USPAT)	AND	ON	ON	2021/03/10

N130	578	H01Q1/245.cpc.	(USPAT)	AND	ON	ON	12:12 PM 2021/03/10
N131	1463	N128 or N129 or N130 and (zones or spans)	(USPAT)	AND	ON	ON	12:12 PM 2021/03/10
N132	1	Il6 and (radiation near2 pattern)	(USPAT)	AND	ON	ON	12:13 PM 2021/03/10
N133	188	(N128 or N129 or N130) and (zones or spans)	(USPAT)	AND	ON	ON	12:14 PM 2021/03/10
N134	48	N133 and (radiation near2 pattern)	(USPAT)	AND	ON	ON	12:14 PM 2021/03/10
N135	1495	H04B1/3838.cpc.	(US-PGPUB; USPAT)	AND	ON	ON	12:15 PM 2023/08/28
N136	89	N135 AND steer\$4 AND orientation	(US-PGPUB; USPAT)	AND	ON	ON	09:40 AM 2023/08/28
							09:41 AM



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2

30743
WC&F IP
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

CONFIRMATION NO. 5351
POA ACCEPTANCE LETTER



OC000000058797409

Date Mailed: 06/29/2023

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/19/2023.

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

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

/ylueng/

Application Number * 17/346,533 *	Application/Control No. 17/346,533	Applicant(s)/Patent under Reexamination Rappaport, Theodore S.	
	Examiner SERAYDARYAN, HELENA H	Art Unit 3648	
Document Code - DISQ		Internal Document - DO NOT MAIL	

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed: <u>19 June 2023</u>	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
Td disapproved. See below for reasons, Technology Center: <u>OPLC</u> Telephone: <u>(571)272-6074</u> <u>See Continuation Sheet</u>

Continuation of Approved/Disapproved Comments: Wrong Td form used need to use PTO/AIA/25 form. (Pending Reference)-after September 16, 2012.
Also resubmit Td, no fee is required.

OR

Wrong Td form used need to use PTO/AIA/26 form. (Prior Patent)-after September 16, 2012.
Also resubmit Td, no fee is required.

AND

The terminal disclaimer identifies a party who is not the applicant (only for applications filed on or after September 16, 2012; See FP 14.26.10):

For cases filed on/after 9/16/12, 37 CFR 1.321 specifies that the applicant can disclaim, and the terminal disclaimer must specify the extent of the applicant's ownership.:

A request under 37 CFR 1.46(c) to change the applicant needs to be filed, which is (1) a request, signed by a 1.33(b) party, (2) a corrected ADS (37 CFR 1.76(c)) that identifies the "new" applicant in the applicant information, and is underlined since it is new, and (3) a 3.73(c) statement showing chain of title to the new applicant. Along with the § 1.46(c) request we need a POA that gives power to the attorney who is signing the TD, along with another copy of the TD, unless they file a TD that is signed by the applicant.

TD/ADS And ADS/TD must match the applicant title exactly.

Please note the TD must be re-filed. No new fees are due.
/Lawana Hixon/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Rappaport

Confirmation No. 5351

Serial No. 17/346,533

Group Art Unit 3648

Filed June 14, 2021

Examiner Seraydaryan

For Steerable Antenna Device

Commissioner for Patents

PO Box 1450

Alexandria, Virginia 22313-1450

**PETITION FOR A ONE MONTH EXTENSION OF TIME AND
AMENDMENT UNDER 37 C.F.R. 1.111**

Sir:

In response to the office action mailed February 21, 2023, the applicant petitions for a one month extension of time to respond. The Commissioner is authorized to charge attorney's deposit account 50-2041 (WCF IP) for any deficiency in the application fee.

In response to the office action February 21, 2023, please amend the above-identified patent application as follows:

Amendments to the Specification: begin on page 2

Amendments to the Claims: begin on page 3

Remarks: begin on page 8

Amendments to the Specification

Please amend the Cross-Reference section of the application at page 1, lines 3-7 as follows:

This application is a continuation of US Patent Application Serial No. 13/966,853 filed August 14, 2013, now U.S. Patent 11,063,625, which was a continuation-in-part (CIP) of U.S. Patent Application No. 13/713,804, filed December 13, 2012, now U.S. Patent 8,593,358, which ~~was~~ is a continuation of U.S. Patent Application No. 12/541,764, filed August 14, 2009, now issued Patent No. 8,350,763, which further claims priority to U.S. Provisional Application Serial No. 61/088,829, filed August 14, 2008. ~~The complete contents of all three references are hereby incorporated by reference.~~

Listing of the Claims:

The following is a complete listing of all the claims in the application, with an indication of the status of each:

1. (currently amended) A wireless device configured for avoiding radiation of a user or structure, comprising the steps of:

one or more detectors selected from the group consisting of one or more cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, or motion detectors, ~~or other sensors~~ used for computational determination of spatial orientation in three dimensional space, for detecting an orientation of said wireless device relative to either or both said user and said structure;

one or more processors for determining, based on information provided by said one or more detectors, zones or spans of directions in the three dimensional space corresponding with one or more directions of said user or structure relative to said at least one steerable antenna;

one or more steerable antennas which operate on one or multiple bands and radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz, wherein one or more beams of said one or more steerable antennas is adjustable to accentuate its radiation pattern in one or more directions which are not in said zones or spans of directions in the three dimensional space as determined by said one or more computational devices, wherein said one or more steerable antennas are configured to steer or direct its radiation pattern in particular directions while attenuating the radiation pattern in other directions; and

a controller for adjusting the radiation pattern of the one or more steerable antennas to accentuate one or more of said particular directions while attenuating the radiation pattern for said zones or spans of directions in the three dimensional space.

2. (previously presented) The wireless device of claim 1 wherein said wireless device is selected from the group consisting of computers, telephones, portable computing or communication devices, games, wireless memory media,

radio frequency identification tags, vehicles, clothing, personal data assistants, and navigation assistants.

3. (currently amended) The wireless device of claim 1 further comprising a tuner for tuning said at least one steerable antenna with one or more active ~~or~~ ~~passive~~ elements which are selected or interconnected using electronic control.

4. (previously presented) The wireless device of claim 1 wherein said at least one steerable antenna is configured for transmitting, receiving, or transmitting and receiving simultaneously in a plurality of different bands.

5. (previously presented) The wireless device of claim 4 further comprising a processor for controlling tuning of one or more circuits for said at least one steerable antenna to operate in said plurality of different bands.

6. (previously presented) The wireless device of claim 1, wherein said at least one steerable antenna comprises a plurality of steerable antennas.

7. (currently amended) A method for avoiding or reducing radiation of a user or structure by a wireless device having at least one steerable antenna, comprising:
sensing with one or more sensors selected from the group consisting of cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, or motion detectors, ~~or~~ ~~other sensors~~ used for computational determination of spatial orientation in three dimensional space, an orientation of said wireless device relative to either or both said user and said structure;

receiving signals from said one or more sensors pertaining to said orientation in the three dimensional space;

using said signals, computing zones or spans of directions corresponding with one or more directions of said user or structure relative to said at least one steerable antenna in the three dimensional space; and

adjusting one or more beams of said at least one steerable antenna to accentuate its radiation pattern in one or more directions which are not in said zones or spans of directions,

wherein said at least one steerable antenna radiates or receives said one or more beams based on signals from said one or more processors determined on execution of said executable instructions,

wherein said at least one steerable antenna operates on one or multiple bands, and

wherein said at least one steerable antenna radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz.

8. (previously presented) The method of claim 7 wherein said wireless device is selected from the group consisting of computers, telephones, portable computing or communication devices, games, wireless memory media, radio frequency identification tags, vehicles, clothing, personal data assistants, and navigation assistants.

9. (currently amended) The method of claim 7 further comprising tuning said at least one steerable antenna with one or more active ~~or passive~~ elements which are selected or interconnected using electronic control.

10. (previously presented) The method of claim 7 wherein said at least one steerable antenna is configured for transmitting, receiving, or transmitting and receiving simultaneously in a plurality of different bands.

11. (previously presented) The method of claim 10 comprising controlling tuning of a tuner for said at least one steerable antenna to operate in said plurality of different bands.

12. (currently amended) A method for avoiding radiation of a user or structure by a wireless device with a steerable antenna system, comprising:

detecting in a three dimensional space with one or more sensors selected from the group consisting of one or more cameras, microphones, audio sensors or transducers, ultrasound sensors, range finders, capacitive sensors, gyroscopes, light detectors, or motion detectors ~~other sensors~~ used for computational determination of spatial orientation in three dimensional space, an orientation of said wireless device relative to either or both said user and said structure;

computing, with a computation module communicatively coupled to said one or more sensors, zones or spans of directions in the three dimensional space;

adjusting at least one steerable antenna that operates on one or multiple bands, which radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz, and that is communicatively coupled to said computation module, so that the at least one steerable antenna radiates or receives one or more beams in one or more directions while attenuating its radiation pattern in said zones or spans of directions in the three dimensional space,

wherein said zones or spans of directions correspond with one or more directions or locations of said user or structure relative to said at least one steerable antenna in the three dimensional space,

wherein said at least one steerable antenna is adjusted in the adjusting step to steer or direct its radiation pattern in particular directions while attenuating the radiation pattern in other directions in the three dimensional space.

13. (previously presented) The method of claim 12 wherein said wireless device is selected from the group consisting of computers, telephones, portable computing or communication devices, games, wireless memory media, radio frequency identification tags, vehicles, clothing, personal data assistants, and navigation assistants.

14. (currently amended) The method of claim 12 further comprising tuning said at least one steerable antenna with one or more active ~~or passive~~ elements which are selected or interconnected using electronic control.

15. (previously presented) The method of claim 12 wherein said at least one steerable antenna is configured for transmitting, receiving, or transmitting and receiving simultaneously in a plurality of different bands.

16. (previously presented) The method of claim 15 comprising controlling tuning of a tuner for said at least one steerable antenna to operate in said plurality of different bands.

17.-19. (canceled)

REMARKS

The Cross-Reference section of the specification is amended to reference the prior applications, all referenced on the application data sheet as originally filed. No new matter is presented.

Solely to place the application in condition for allowance, claims 1, 3, 7, 9, 12, and 14 are amended, and claims 17-19 are canceled. The amendments fully address the rejection for indefiniteness by eliminating “other sensors” from claims 1, 7, and 12, and “passive sensors” from claims 3, 9, and 14. In addition, claims 17-19 have been canceled, thereby making moot the prior rejections and the rejection for indefiniteness of these claims.

The application now includes claims 1-17, all of which are directed to allowable subject matter.

Accompanying this amendment is a terminal disclaimer which obviates the rejection for obviousness type double patenting.

The applicant retains the right to pursue the claims in unamended form and/or other claims supported by the patent application as originally filed in one or more continuation applications.

Reconsideration and immediate allowance of the claims is requested in view of the amendments above.

Respectfully submitted,
/Michael E. Whitham/
Michael E. Whitham
Reg. No. 32,635

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**TERMINAL DISCLAIMER IN A PATENT OR PROCEEDING
IN VIEW OF ANOTHER PATENT**

Docket Number (Optional)

08610010c2

Application/Control Number: 17/346,533Filing Date: 06 14 2021First Named Inventor: RappaportTitle: Steerable Antenna Device

Patent No.:

The patentee, Rappaport, owner of 100 percent interest in the instant patent hereby disclaims, except as provided below, the terminal part of the statutory term of the instant patent which would extend beyond the expiration date of the full statutory term of patent No. 11,063,625 (the "reference patent"), as the term of said reference patent is presently shortened by any terminal disclaimer. The patentee hereby agrees that the instant patent shall be enforceable only for and during such period that the instant patent and the reference patent are commonly owned. This agreement runs with the instant patent and is binding upon the grantee, its successors or assigns.

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

I. Check either box 1, 2, or 3 below, as appropriate, if there is an assignment:

1. ☐ The current ownership was established by the filing of a statement under 37 CFR 3.73 during prosecution of the application that issued as the instant patent.
2. ☒ The instant patent was issued from an application filed on or after September 16, 2012, and the current patent owner was the applicant under 37 CFR 1.46.
3. ☐ A statement under 37 CFR 3.73 is attached herewith. Form PTO/SB/96 or PTO/AIA/96, as appropriate, may be used.

II. Authorization for Terminal Disclaimer - Check either box 1 or 2 below, if appropriate:

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

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.
2. ☒ The undersigned is an attorney or agent of record. Reg. No. 32635

/Michael E. Whitham/6/19/23

Signature

Date

Michael E. Whitham703-787-9400

Typed or printed name

Telephone number

- ☒ The terminal disclaimer fee under 37 CFR 1.20(d) is included.

NOTE: Submit multiple forms if more than one signature is required, see below.*

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Rappaport

Confirmation No. 5351

Serial No. 17/346,533

Group Art Unit 3648

Filed June 14, 2021

Examiner Seraydaryan

For Steerable Antenna Device

Commissioner for Patents

PO Box 1450

Alexandria, Virginia 22313-1450

SUBMISSION OF POWER OF ATTORNEY

Sir:

Attached hereto is a power of attorney for the undersigned to act in the above-identified application

Respectfully submitted,

/Michael E. Whitham/

Michael E. Whitham

Reg. No. 32,635

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Customer No.: 30743

Doc Code: PA..
Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

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

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/B2A.)

- (Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)
- ☒ I hereby appoint the Patent 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 identified above: 30743
- OR
- ☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) 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 patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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

- Letter to:
- ☒ The address associated with the above-mentioned Customer Number
OR
☐ The address associated with Customer Number:
OR

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

I am the Applicant (If the Applicant is a juristic entity, list the Applicant name in the box):

I am the Applicant (If the Applicant is a foreign entity, please provide the name of the foreign entity and its address in the country of origin.)

- ☒ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☐ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ 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) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Theodore S. Rappaport		
Title			

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. 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.

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Electronic Patent Application Fee Transmittal

Application Number:	17346533			
Filing Date:	14-Jun-2021			
Title of Invention:	Steerable Antenna Device			
First Named Inventor/Applicant Name:	Theodore S. Rappaport			
Filer:	Michael E. Whitham			
Attorney Docket Number:	08610010C2			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 1 month with \$0 paid	2251	1	88	88
Miscellaneous:				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	170	170
Total in USD (\$)				258

Electronic Acknowledgement Receipt

EFS ID:	48172260
Application Number:	17346533
International Application Number:	
Confirmation Number:	5351
Title of Invention:	Steerable Antenna Device
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	164319
Filer:	Michael E. Whitham
Filer Authorized By:	
Attorney Docket Number:	08610010C2
Receipt Date:	19-JUN-2023
Filing Date:	14-JUN-2021
Time Stamp:	14:18:03
Application Type:	Utility under 35 USC 111(a)

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Payment was successfully received in RAM	\$ 258
RAM confirmation Number	E20236IE18466463
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		08610010c2_06_19_23.pdf	39968	yes	8
			0678ff7dcf8ddc93dd286b6f54b873486bad8d9c		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment/Request for Reconsideration-After Non-Final Rejection		1	1	
	Specification		2	2	
	Claims		3	7	
	Applicant Arguments/Remarks Made in an Amendment		8	8	
Warnings:					
Information:					
2	Terminal Disclaimer Filed	2023_06_19_TD.pdf	112539	no	2
			08928e00dd5fc6855a63293f32bbccf480d0d95		
Warnings:					
Information:					
3	Power of Attorney	08610010c2_sub_poa.pdf	11930	no	1
			9f7c4c9d79324d920dfd6fce2773a9e9a8418bd3		
Warnings:					
Information:					
4	Power of Attorney	2023-06-19_POA.pdf	59954	no	1
			669e98b4a48ba185a187009b3b71f915f95a894a		
Warnings:					
Information:					

5	Fee Worksheet (SB06)	fee-info.pdf	40394 acbff84985712bc26910bbe70c03949296e3572d	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			264785		
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/346,533	Filing Date 06/14/2021	☐ To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 = *		x \$50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x \$240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED - PART II

	(Column 1)		(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	06/19/2023		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	x \$40 = 0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x \$192 = 0
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						0
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/DEBORAH A POLLARD/
*** 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.						

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.**

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**Courtesy Reminder for
Application Serial No: 17/346,533**

Attorney Docket No: 08610010C2

Customer Number: 164319

Date of Electronic Notification: 02/23/2023

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

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:
action@wcc-ip.com

To view your correspondence online or update your email addresses, please visit us anytime at <https://ppair-my.uspto.gov/pair/PrivatePair>. If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2	5351
164319	7590	02/21/2023	EXAMINER	
W&C IP			SERAYDARYAN, HELENA H	
11491 Sunset Hills Road			ART UNIT	PAPER NUMBER
Suite 340			3648	
Reston, VA 20190			NOTIFICATION DATE	DELIVERY MODE
			02/21/2023	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):

action@wcc-ip.com

Office Action Summary

Application No.

17/346,533

Applicant(s)

Rappaport, Theodore S.

Examiner

HELENA H SERAYDARYAN

Art Unit

3648

AIA (FITF) Status

No

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 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 09/10/2021.

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

2a) ☐ This action is **FINAL**.

2b) ☒ This action is non-final.

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

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

Disposition of Claims*

5) ☒ Claim(s) 1-19 is/are pending in the application.

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

6) ☐ Claim(s) ____ is/are allowed.

7) ☒ Claim(s) 1-19 is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

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

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

Application Papers

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

11) ☒ The drawing(s) filed on 06/14/2021 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)

3) ☐ Interview Summary (PTO-413)

Paper No(s)/Mail Date ____.

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)

4) ☐ Other: ____.

Paper No(s)/Mail Date ____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Double Patenting

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 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); *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 nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See

MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1, 7, 12 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1, 11 and 23 of U.S. Patent No. US 11063625 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because the scope of the invention is the same.

Here is comparison of Claim 1 of the current application and claims 11, 23 of US 11063625 B2.

Current Application	US 11063625 B2
one or more detectors selected from the group consisting of one or more cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders,	one or more sensors selected from the group consisting of cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders,

capacitive sensors, gyroscopes, light detectors, motion detectors, or other sensors used for computational determination of spatial orientation in three dimensional space, for detecting an orientation of said wireless device relative to either or both said user and said structure, one or more processors for determining, based on information provided by said one or more detectors, zones or spans of directions in the three dimensional space corresponding with one or more directions of said user or structure relative to said at least one steerable antenna;	capacitive sensors, gyroscopes, light detectors, or motion detectors configured to detect in a three dimensional space an orientation of said wireless device relative to either or both said user and said structure; one or more processors communicatively coupled to said one or more sensors; a non-transitory computer readable medium comprising executable instructions that when executed by said one or more processors cause said one or more processors to perform the steps of: receiving signals from said one or more sensors pertaining to said orientation in the three dimensional space; using said signals, computing zones or spans of directions corresponding with one or more directions of either or both said user and said structure relative to said at least one
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	steerable antenna in the three dimensional space;
one or more steerable antennas which operate on one or multiple bands and radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz, wherein one or more beams of said one or more steerable antennas is adjustable to accentuate its radiation pattern in one or more directions which are not in said zones or spans of directions in the three dimensional space as determined by said one or more computational devices, wherein said one or more steerable antennas are configured to steer or direct its radiation pattern in particular directions while attenuating the radiation pattern in other directions; and	at least one steerable antenna communicatively coupled to said one or more processors wherein said at least one steerable antenna is configured to adjust a beam radiation pattern so as to steer or direct its energy in particular directions while providing nulls or dead zones in other directions, wherein said at least one steerable antenna radiates at one or more frequencies in the range of 10 GHz to 500 GHz;
a controller for adjusting the radiation pattern of the one or more steerable antennas to accentuate one or more of said particular directions while attenuating	adjusting one or more beam radiation patterns of said at least one steerable antenna to radiate in one or more directions of said particular directions

the radiation pattern for said zones or spans of directions in the three dimensional space.	which are not in said zones or spans of directions in the three dimensional space, wherein said at least one steerable antenna radiates said one or more beams based on signals from said one or more processors determined on execution of said executable instructions,
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The following is the comparison for claims 7 and 12 of the current application and claim 1 of the patent US 11063625 B2:

Current Application	US 11063625 B2
sensing with one or more sensors selected from the group consisting of cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, motion detectors, or other sensors used for computational determination of spatial orientation in three dimensional space, an orientation of said wireless device relative to either or both said user and said structure;	detecting in a three dimensional space, using one or more cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, or motion detectors, an orientation of said wireless device relative to either or both said user and said structure;

receiving signals from said one or more sensors pertaining to said orientation in the three dimensional space;	
using said signals, computing zones or spans of directions corresponding with one or more directions of said user or structure relative to said at least one steerable antenna in the three dimensional space; and	determining zones or spans of directions in the three dimensional space corresponding with one or more directions of either or both said user and said structure relative to said at least one steerable antenna;
adjusting one or more beams of said at least one steerable antenna to accentuate its radiation pattern in one or more directions which are not in said zones or spans of directions, wherein said at least one steerable antenna radiates or receives said one or more beams based on signals from said one or more processors determined on execution of said executable instructions, wherein said at least one steerable antenna operates on one or multiple bands, and	adjusting one or more beam radiation patterns of said at least one steerable antenna to radiate in one or more directions which are not in said zones or spans of directions in the three dimensional space, wherein said at least one steerable antenna is configured to steer or direct its energy in particular directions while providing nulls or dead zones in other directions, and wherein said adjusting step adjusts the one or more beam radiation patterns for direction of energy to one or more of said particular directions while avoiding said zones or

	spans of directions in the three dimensional space,
wherein said at least one steerable antenna radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz.	wherein said at least one steerable antenna operates on one or multiple bands and radiates at one or more frequencies in the range of 10 GHz to 500 GHz.

Claims 17 rejected on the ground of nonstatutory double patenting as being unpatentable over claim 1 of U.S. Patent No. US 8350763 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because the scope of the invention is the same. Claims of current Application are narrower than the claims of parent Application and the choice of the operating range is obvious modification for one of ordinary skills in the art.

The following is the comparison of claim 17 of the current application and claim 1 of US 8350763 B2:

Current Application	US 8350763 B2
one or more antennas	one or more antennas;
a plurality of transmitters, receivers or transceivers that operate in one or more frequency bands, wherein at least one	a plurality of transmitters, receivers or transceivers that operate in one or more frequency bands, wherein at least one

antenna of said one or more antennas is used by said plurality of transmitters, receivers, or transceivers in a plurality of different bands, and radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz.	antenna of said one or more antennas is used by said plurality of transmitters, receivers or transceivers in a plurality of different bands
wherein said at least one antenna is one or more of a) an actively tuned antenna,	wherein said at least one antenna is one or more of a) an actively tuned antenna,
b) tuned by one or more passive elements which are selected or interconnected using electronic control.	b) is tuned by one or more passive elements which are selected or interconnected using electronic control.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):

(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-17 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention. For claims 1, 7 and

12 scope of the limitation “other sensors” is indefinite, the BRI does include sensors not envisioned in the specification at the time of invention.

Claims 3, 9, 14 and 17-19 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

For claims 3, 9, 14 and 17 scope of the limitation “passive element” is indefinite. Specification does not define the term “passive element”. It is indefinite what Applicant means by passive element, is it resistor, capacitor or some type of specific circuitry.

It is also unclear what applicant means “tuned by **one or more passive elements which are selected or interconnected using electronic control**”. It is clear that if you have multiple passive elements you can interconnect them, but what do you interconnect if only single passive element is present.

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

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

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

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

Claim 17-19 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, because the specification, while being enabling for “a plurality of transmitters, receivers or transceivers that operate in plurality frequency bands”, does not reasonably provide enablement for “a plurality of transmitters, receivers or transceivers that operate in single frequency bands” . The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

According to claim 17 one of the possible claim interpretations is

17. A wireless device, comprising:

one or more antennas; and

a plurality of transmitters, receivers or transceivers that **operate in one frequency bands,**

wherein at least one antenna of said one or more antennas is used by said plurality of transmitters, receivers, or transceivers **in a plurality of different bands.**

The two limitations are contradicting to each other as if a plurality of transmitters, receivers or transceivers **operate in one frequency bands,** antenna cannot be used in plurality different bands.

Claim Rejections - 35 USC § 102

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

A person shall be entitled to a patent unless –

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

Claim(s) 17 is/are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Atarashi US 20040235415 A1.

Regarding claim 17 Atarashi teaches

17. A wireless device, comprising:

One(120) or more antennas; and

a plurality of transmitters, receivers(100+ tuner1, 100+tuner2 fig. 1) or transceivers that operate in one or more frequency bands, wherein at least one antenna of said one or more antennas is used by said plurality of transmitters, receivers, or transceivers in a plurality of different bands[0035, [0036]], and ~~radiates or receives~~ at one or more frequencies in the range of 10 GHz to 500 GHz.[0010]

wherein said at least one antenna is one or more of a) an actively tuned antenna, [0038]and

b) tuned by one or more passive elements which are selected or interconnected using electronic control.

Claim Rejections - 35 USC § 103

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

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

Claim 18-19 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Atarashi (US 20040235415 A1) and further in view of Dorsey (US 20090295648 A1).

Atarashi does not teach

18. said at least one antenna of said one or more antennas that forms an adaptive antenna that adaptively alters its radiation pattern so as to attenuate radio energy transmitted to or received from particular zones or spans of directions.

19. said at least one antenna of said one or more antennas that forms an adaptive antenna that adaptively alters its radiation pattern so as to accentuate radio energy transmitted to or received from particular zones or spans of directions.

However, Dorsey teaches

18. said at least one antenna of said one or more antennas that forms an adaptive antenna that adaptively alters its radiation pattern so as to attenuate radio energy transmitted to or received from particular zones or spans of directions.[0045-0046, 0050. 0062, 0065, 0069].

19. said at least one antenna of said one or more antennas that forms an adaptive antenna that adaptively alters its radiation pattern so as to accentuate radio energy transmitted to or received from particular zones or spans of directions. .[0045-0046, 0050, 0062, 0065, 0069].

It would be obvious to one of ordinary skills in the art at the time of the filing to modify invention by Atarashi with attenuating or accentuating transmitted radio energy by Dorsey in order to be able to provide improved antenna diversity systems (Dorsey: [0006]).

Allowable Subject Matter

Claims 1-16 are allowable over prior art.

For Claims 1-16, the following is a statement of reasons for the indication of allowable subject matter: the Examiner has not found any prior art that would render obvious the claim limitations directed to “one or more processors for determining, based on information provided by said one or more detectors, zones or spans of directions in the three dimensional space corresponding with one or more directions of said user or structure relative to said at least one steerable antenna”.

Claims 1-16 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HELENA SERAYDARYAN whose telephone number is (571)270-0706. The examiner can normally be reached on M-T, 7:30-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Erin Heard can be reached on (571)272-3236. 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 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.

/HELENA H SERAYDARYAN/
Examiner, Art Unit 3648

/TIMOTHY A BRAINARD/
Primary Examiner, Art Unit 3648

<i>Notice of References Cited</i>	Application/Control No. 17/346,533		Applicant(s)/Patent Under Reexamination Rappaport, Theodore S.	
	Examiner HELENA H SERAYDARYAN		Art Unit 3648	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-20040235415-A1	11-2004	Atarashi, Hiroshi	H04H40/90	455/334
*	B	US-20090295648-A1	12-2009	Dorsey, John G.	H01Q21/28	343/702
	C					
	D					
	E					
	F					
	G					
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	I					
	J					
	K					
	L					
	M					

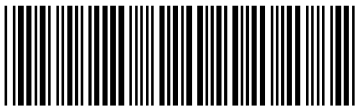
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
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	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.

<i>Search Notes</i> 	Application/Control No. 17/346,533	Applicant(s)/Patent Under Reexamination Rappaport, Theodore S.
	Examiner HELENA H SERAYDARYAN	Art Unit 3648

CPC - Searched*		
Symbol	Date	Examiner
H04B1/3838	11/30/2022	HS

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor Name Search in PALM	11/30/2022	HS
Inventor Name Search in PE2E search	11/30/2022	HS
Text Search in PE2E	11/30/2022	HS

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/HELENA H SERAYDARYAN/ Examiner, Art Unit 3648	
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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	104	((Theodore) near2 (Rappaport)).INV.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/04/01 01:02 PM
L2	218	((Theodore) near2 (Rappaport)).INV.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/01 01:02 PM
L3	1	L2 and ((steerable adj antenna) with sensors)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/01 01:04 PM
L4	1748	342/368.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/01 01:04 PM
L5	3044	H01Q1/245.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:44 PM
L6	2704	H04B1/3838.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:44 PM
L7	4870	H01Q3/24.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L8	6373	H01Q3/26.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L9	0	H01Q3/243.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L10	23279	H01Q1/243.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:46 PM
L11	196	steer\$4 with sensor with phone	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:47 PM
L12	1	L11 and Lee.inv.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:47 PM
L13	1	L11 and Lee.in.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:48 PM
L14	36859	L5 or L6 or L7 or L8 or L10	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:49 PM
L15	1	L14 and L11	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:49 PM
L16	775	steer\$4 with sensor with (phone or mobile or cellphone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:49 PM
L17	11	L16 and Lee.in.	(US-PGPUB; USPAT;	AND	ON	ON	2016/04/11

L18	6	L14 and L16	USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	04:50 PM
L19	3	"52780741".FMID.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:50 PM
L20	1533	L14 and Lee.in.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:51 PM
L21	452	L20 and (cellphone or phone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:52 PM
L22	77	L20 and (cellphone or phone)S21 and sensor	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:52 PM
L23	1	L22 and (steer\$4 or redirect\$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:55 PM
L24	73	L22 and (steer\$4 or redirect\$4 or direct\$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 04:56 PM
L25	1	2014-T60821.NRAN.	(DERWENT)	AND	ON	ON	2016/04/11 04:57 PM
L26	19336	((steer\$4 or redirect\$4 or direct or direction or directionality) with (sensor or camera) with (user or person)) and (phone or mobile or cellphone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:27 PM
L27	41	L14 and L26	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:27 PM
L28	25566	((steer\$4 or redirect\$4 or direct or direction or directionality or pattern) with (sensor or camera) with (user or person)) and (phone or mobile or cellphone)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:33 PM
L29	79	L14 and L28	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:34 PM
L30	27	H01Q1/245.cpc. and steer	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:35 PM
L31	277	H01Q1/245.cpc. and sensor	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/11 05:49 PM
L32	1058	steer\$4 with antenna with mobile	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/04/12 09:08 AM

L33	5	"9529117".FMID.	(US-PGPUB; USPAT; FPRS)	AND	ON	ON	2016/04/12 09:34 AM
L34	2	(US-20080242349-\$).did. or (US-6456856-\$).did.	(US-PGPUB; USPAT)	AND	ON	ON	2016/04/12 10:53 AM
L35	40	342/368.ccls. and @pd>"20160506"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/02 04:57 PM
L36	91	H01Q1/245.cpc. and @pd>"20160506"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/02 04:59 PM
L37	13356	(multiple or dual) near2 (frequency adj2 band)	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:45 AM
L38	5187	L37 and GHz	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:45 AM
L39	4852	L38 and communicat\$4	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:46 AM
L40	3177	H01Q1/245.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L41	2962	H04B1/3838.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L42	5154	H01Q3/24.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L43	6655	H01Q3/26.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L44	25291	H01Q1/243.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L45	39574	L40 or L41 or L42 or L43 or L44	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 10:48 AM
L46	705	L39 and L45	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/14 10:48 AM
L47	1	("2013/0328723").URP N.	(USPAT)	AND	ON	ON	2016/11/14 02:56 PM
L48	224	((Theodore) near2 (Rappaport)).INV.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 04:59 PM
L49	89	L48 and GHz and (dual or multiple)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2016/11/14 04:59 PM
L50	29	("2010/0060531").URP N.	(USPAT)	AND	ON	ON	2016/11/15 10:28 AM
L51	34	("2004/0214621").URP N.	(USPAT)	AND	ON	ON	2016/11/15 10:42 AM
L52	38	("2003/0210203").URP N.	(USPAT)	AND	ON	ON	2016/11/15 10:59 AM

L53	21	L52 and GHz	(USPAT)	AND	ON	ON	2016/11/15 10:59 AM
L54	13	("2006/0084395").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:05 AM
L55	13	("2006/0084395").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:05 AM
L56	16	("2009/0011806").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:11 AM
L57	0	("2004/0217909").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:12 AM
L58	0	("2004/0217909").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:12 AM
L59	34	("2004/0214621").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:12 AM
L60	55	("5229975" "5274844" "5541609" "5729238" "5805067" "5924020" "5956626" "5995862").PN. OR ("6456856").URPN.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/15 11:19 AM
L61	4	("2008/0242349").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:27 AM
L62	24	("2008/0018543").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:28 AM
L63	0	("2013/0342416").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:32 AM
L64	4	("2009/0124306").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:33 AM
L65	9	("20070008235" "20080204240" "20130135171" "5983119" "7492254" "8106836").PN. OR ("8649833").URPN.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/15 11:35 AM
L66	3	("2010/0081491").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:38 AM
L67	0	("2008/0150798").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:39 AM
L68	6	("2007/0057843").URP N.	(USPAT)	AND	ON	ON	2016/11/15 11:40 AM
L69	46	("4352109" "4518968" "4700194" "4868576" "5257033" "5612705").PN. OR ("6421016").URPN.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2016/11/15 11:41 AM
L70	0	(mmv or (milimeter adj wave)) same (multi?band or (multiple adj band) or (dual adj band) or dual-band) same antenna	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:09 AM
L71	7	(mmw or (milimeter adj	(US-PGPUB; USPAT;	AND	ON	ON	2017/06/21

		wave)) same (multi?band or (multiple adj band) or (dual adj band) or dual-band) same antenna	USOCR)				10:09 AM
L72	23	(mmw or (milimeter adj wave)) same2 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same2 antenna	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:10 AM
L73	19	L72 and GHz	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:11 AM
L74	23	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same3 antenna	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2017/06/21 10:13 AM
L75	23	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same3 antenna	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/06/21 10:13 AM
L76	23	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band) same3 antenna	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/06/21 10:14 AM
L77	46	(mmw or (milimeter adj wave)) same3 (multi?band or (multiple adj band) or (dual adj band) or dual-band)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/06/21 10:15 AM
L78	4	("2014/0321282").URP N.	(USPAT)	AND	ON	ON	2017/06/21 10:52 AM
L79	2	US-6556836-\$.did.	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/18 08:04 AM
L80	2	"25301096".FMID.	(US-PGPUB; USPAT; FPRS)	AND	ON	ON	2017/07/18 08:07 AM
L81	4	("2002/0164957").URP N.	(USPAT)	AND	ON	ON	2017/07/18 09:12 AM
L82	4401	(millimeter adj wave) same (cellular or mobile or cellphone or communication)	(USPAT)	AND	ON	ON	2017/07/18 09:34 AM
L83	2827	"l6" and dual	(USPAT)	AND	ON	ON	2017/07/18 09:34 AM
L84	944	L82 and dual	(USPAT)	AND	ON	ON	2017/07/18 09:34 AM

L85	184	((millimeter adj wave) same wireless) and (multiband or (dual adj band))	(USPAT)	AND	ON	ON	2017/07/18 01:54 PM
L86	563	(cellphone or (cellular or mobile) adj phone) and (steerable near2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/18 04:40 PM
L87	563	(cellphone or ((cellular or mobile) adj phone)) and (steerable near2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/18 04:49 PM
L88	2	"40137022".FMID.	(US-PGPUB; USPAT; FPRS)	AND	ON	ON	2017/07/19 11:04 AM
L89	0	H01Q1/245.cpc. and @pd>"20171123"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/19 02:15 PM
L90	0	342/368.ccls. and @pd>"20171123"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/07/19 02:15 PM
L91	60	H01Q1/245.cpc. and @pd>"20170726"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/11/07 02:24 PM
L92	32	342/368.ccls. and @pd>"20170726"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2017/11/07 02:24 PM
L93	0	sensor near10 (three adj simensions)	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/04/26 10:06 AM
L94	3994	sensor near10 (three adj dimensions)	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/04/26 10:06 AM
L95	1206	L94 and phone	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/04/26 10:07 AM
L96	0	us-20090295648	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:34 PM
L97	2	us-20090295648-\$.did.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:34 PM
L98	7612629	WO "2012066562"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:41 PM
L99	2	"WO 2012066562"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:41 PM
L100	2	us-20040204027-\$.did.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/10 03:43 PM
L101	7620701	WO "2012066562"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/16 10:09 AM
L102	4611	L101 and prasad.inv.	(US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	OFF	OFF	2018/05/16 10:09 AM

L103	9	((Muthukumar) near2 (Prasad)).INV.	DERWENT) (US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/16 10:10 AM
L104	9	L101 and L103	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/16 10:11 AM
L105	7	L102 and SAR and proximity	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2018/05/16 10:16 AM
L106	9	((Muthukumar) near2 (Prasad)).INV.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/23 03:46 PM
L107	1	"wo 2012/176217"	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/23 03:47 PM
L108	9	"wo 2012176217"	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2018/05/23 03:47 PM
L109	15	"wo 2012176217"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/05/23 03:48 PM
L110	96	H01Q1/245.cpc. and @pd>"20171115"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/05/29 01:08 PM
L111	39	342/368.ccls. and @pd>"20171115"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/05/29 01:09 PM
L112	2	"41379128".FMID.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 07:11 AM
L113	72	("20050090288" "20050124305" "20060161871" "20060205368" "20060232468" "5463406" "5905467" "6285893" "6456856" "6862433" "6959209" "6978121").PN. OR ("8159399").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/06/07 07:11 AM
L114	2	"41379128".FMID.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 07:12 AM
L115	8104	343/702.ccls.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:21 AM
L116	0	342/876.ccls.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L117	952	343/876.ccls.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L118	2324	H01Q1/2266.cpc.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L119	5174	H01Q3/24.cpc.	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:22 AM
L120	15520	L115 or L117 or L118 or L119	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM
L121	839	L120 and sensors	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM

L122	812	L121 and antenna	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM
L123	306	L122 and orientation	(US-PGPUB; USPAT; FPRS)	OR	OFF	OFF	2018/06/07 08:23 AM
L124	65	H01Q1/245.cpc. and @pd>"20180614"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/10/22 09:13 AM
L125	24	342/368.ccls. and @pd>"20180614"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2018/10/22 09:13 AM
L126	683	H01Q1/245.cpc. and @pd>"20181030"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2021/03/10 12:10 PM
L127	63	342/368.ccls. and @pd>"20181030"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT)	AND	ON	ON	2021/03/10 12:10 PM
L135	0	"2013004065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:21 AM
L136	1	"20130004065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:21 AM
L137	1	"20130040065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:21 AM
L138	0	"201304065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:22 AM
L139	0	"2013040065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:22 AM
L140	0	"20013004065".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:22 AM
L141	302	Keidar.inv.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:23 AM
L142	1	"20130040655".pn.	(US-PGPUB; USPAT; USOCR)	AND	ON	ON	2021/03/31 10:25 AM
L143	2	"7369829".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 08:37 AM
L144	115015748	@pd<="20080814"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:01 AM
L145	1027883	antenna AND (band range) WITH (plurality two several)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU,	OR	ON	ON	2022/11/30 09:02 AM

L146	199944	antenna AND (band range) WITH (plurality two several) WITH (transmitter receiver generat\$4 transceiver)	SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:03 AM
L147	47273	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:04 AM
L148	13342	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:04 AM
L149	1965	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/11/30 09:04 AM
L150	784	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:05 AM
L151	365	antenna AND (band range) WITH (plurality two several) near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc. AND tun\$4	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:09 AM
L152	1	"11063625".pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:18 AM
L153	67	antenna AND (band range) WITH (plurality two several)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 09:41 AM

L154	1387306	near2(transmitter receiver generat\$4 transceiver) AND ghz AND h01q\$.cpc. AND tun\$4 AND L144	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:07 AM
L155	5795	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:08 AM
L156	3006	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:10 AM
L157	683	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna AND (h01q\$.cpc. OR H04B\$.cpc.)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:11 AM
L158	2421	marks.in. AND game	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:38 AM
		L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:38 AM

L159	5	radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna AND (h01q\$.cpc. OR H04B1/3838.cpc.)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/11/30 10:38 AM
L160	139	L144 AND (camera microphones transducers range ADJ finder gyroscope (light motion proximity capacitive MEMS ultraso\$4 audio IR) near2 (detector sensor) sensors lidar ladar radar sonar) AND (steerable phased focus\$4 beamform\$4 adjustable) near3 antenna AND (H04B1/3838.cpc.) (((("RAPPAPORT") near3 ("Theodore")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/11/30 10:49 AM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Bibliographic Data

Application No: 17/346,533

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged:

/HELENA H
SERAYDARYAN/

Examiner's Signature

Initials

Title:

Steerable Antenna Device

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/14/2021	342	3648	08610010C2
RULE			

APPLICANTS

INVENTORS

Theodore S. Rappaport, Riner, VA, UNITED STATES

CONTINUING DATA

This application is a CON of 13966853 08/14/2013 PAT 11063625

13966853 is a CIP of 13713804 12/13/2012 PAT 8593358

13713804 is a CON of 12541764 08/14/2009 PAT 8350763

12541764 has PRO of 61088829 08/14/2008

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

06/23/2021

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

W&C IP

11491 Sunset Hills Road

Suite 340

Reston, VA 20190

UNITED STATES

FILING FEE RECEIVED

\$1,020



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2

CONFIRMATION NO. 5351

PUBLICATION NOTICE



OC000000130674051

164319
W&C IP
11491 Sunset Hills Road
Suite 340
Reston, VA 20190

Title:Steerable Antenna Device

Publication No.US-2021-0399755-A1

Publication Date:12/23/2021

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.

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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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/346,533				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	350		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	19	minus 20 = *	x 50 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4	minus 3 = *	x 240 =	240						
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	1070		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR 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		OR 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
17/346,533	06/14/2021	2845	1150	08610010C2	19	4

CONFIRMATION NO. 5351
UPDATED FILING RECEIPT

164319
W&C IP
11491 Sunset Hills Road
Suite 340
Reston, VA 20190



Date Mailed: 09/17/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Theodore S. Rappaport, Riner, VA;

Applicant(s)

Theodore S. Rappaport, Riner, VA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 13/966,853 08/14/2013 PAT 11063625
which is a CIP of 13/713,804 12/13/2012 PAT 8593358
which is a CON of 12/541,764 08/14/2009 PAT 8350763
which claims benefit of 61/088,829 08/14/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

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: 06/23/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/346,533**

Projected Publication Date: 12/23/2021

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Steerable Antenna Device

Preliminary Class

343

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

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Effective Date	Sale Item Reference Number	Refund Total
09/10/2021	17346533	\$80.00

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method	Account Number
I20219EC00140714	2051	LATE FILING FEE FOR OATH OR DECLARATION	\$80.00	DA	502041



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Document Code:WFEE

User :C43106

Sale Adjustment Accounting Date:09/15/2021

Effective Date	Sale Accounting Date	Sale Item Reference Number
09/10/2021	09/15/2021	17346533

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20219EC00140714	2051	LATE FILING FEE FOR OATH OR DECLARATION	\$80.00	DA



United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :C46910

Sale Accounting Date:09/14/2021

Sale Item Reference Number
17346533

Effective Date
09/10/2021

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20219D023080694	2201	INDEPENDENT CLAIMS IN EXCESS OF 3	\$240.00	Deposit Account
I20219D023080694	2051	LATE FILING FEE FOR OATH OR DECLARATION	\$80.00	Deposit Account

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re patent application of

T. Rappaport

Confirmation No.: 5351

Serial No.: 17/346,533

Group Art Unit: 2845

Filed: June 14, 2021

Examiner: Unassigned

For: **Steerable Antenna Device**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE MISSING PARTS

Sir:

In response to the Notice to File Missing Parts mailed June 25, 2021, submitted herewith is the following:

1. A set of claims;
2. \$910 in filing fees; and
3. \$110 extension of time fee.

If any extension of time is required with this document, applicant hereby makes a written conditional petition for extension of time. Please charge any deficiencies in fees or credit any overpayment to Attorney's Deposit Account Number 50-2041.

Respectfully submitted,

/Michael E. Whitham/

Michael E. Whitham

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(703) 787-9400

Customer Number 164319

Claims

1. A wireless device configured for avoiding radiation of a user or structure, comprising the steps of:

one or more detectors selected from the group consisting of one or more cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, motion detectors, or other sensors used for computational determination of spatial orientation in three dimensional space, for detecting an orientation of said wireless device relative to either or both said user and said structure;

one or more processors for determining, based on information provided by said one or more detectors, zones or spans of directions in the three dimensional space corresponding with one or more directions of said user or structure relative to said at least one steerable antenna;

one or more steerable antennas which operate on one or multiple bands and radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz, wherein one or more beams of said one or more steerable antennas is adjustable to accentuate its radiation pattern in one or more directions which are not in said zones or spans of directions in the three dimensional space as determined by said one or more computational devices, wherein said one or more steerable antennas are configured to steer or direct its radiation pattern in particular directions while attenuating the radiation pattern in other directions; and

a controller for adjusting the radiation pattern of the one or more steerable antennas to accentuate one or more of said particular directions while attenuating the radiation pattern for said zones or spans of directions in the three dimensional space.

2. The wireless device of claim 1 wherein said wireless device is selected from the group consisting of computers, telephones, portable computing or communication devices, games, wireless memory media, radio frequency identification tags, vehicles, clothing, personal data assistants, and navigation assistants.

3. The wireless device of claim 1 further comprising a tuner for tuning said at least one steerable antenna with one or more active or passive elements which are selected or interconnected using electronic control.

4. The wireless device of claim 1 wherein said at least one steerable antenna is configured for transmitting, receiving, or transmitting and receiving simultaneously in a plurality of different bands.

5. The wireless device of claim 4 further comprising a processor for controlling tuning of one or more circuits for said at least one steerable antenna to operate in said plurality of different bands.

6. The wireless device of claim 1, wherein said at least one steerable antenna comprises a plurality of steerable antennas.

7. A method for avoiding or reducing radiation of a user or structure by a wireless device having at least one steerable antenna, comprising:

sensing with one or more sensors selected from the group consisting of cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, motion detectors, or other sensors used for computational determination of spatial orientation in three dimensional space, an orientation of said wireless device relative to either or both said user and said structure;

receiving signals from said one or more sensors pertaining to said orientation in the three dimensional space;

using said signals, computing zones or spans of directions corresponding with one or more directions of said user or structure relative to said at least one steerable antenna in the three dimensional space; and

adjusting one or more beams of said at least one steerable antenna to accentuate its radiation pattern in one or more directions which are not in said zones or spans of directions,

wherein said at least one steerable antenna radiates or receives said one or more beams based on signals from said one or more processors determined on execution of said executable instructions,

wherein said at least one steerable antenna operates on one or multiple bands, and

wherein said at least one steerable antenna radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz.

8. The method of claim 7 wherein said wireless device is selected from the group consisting of computers, telephones, portable computing or communication devices, games, wireless memory media, radio frequency identification tags, vehicles, clothing, personal data assistants, and navigation assistants.

9. The method of claim 7 further comprising tuning said at least one steerable antenna with one or more active or passive elements which are selected or interconnected using electronic control.

10. The method of claim 7 wherein said at least one steerable antenna is configured for transmitting, receiving, or transmitting and receiving simultaneously in a plurality of different bands.

11. The method of claim 10 comprising controlling tuning of a tuner for said at least one steerable antenna to operate in said plurality of different bands.

12. A method for avoiding radiation of a user or structure by a wireless device with a steerable antenna system, comprising:

detecting in a three dimensional space with one or more sensors selected from the group consisting of one or more cameras, microphones, audio sensors or transducers, ultrasound sensors, range finders, capacitive sensors, gyroscopes, light detectors, or other sensors used for computational determination of spatial orientation in three dimensional space, an orientation of said wireless device relative to either or both said user and said structure;

computing, with a computation module communicatively coupled to said one or more sensors, zones or spans of directions in the three dimensional space;

adjusting at least one steerable antenna that operates on one or multiple bands, which radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz, and that is communicatively coupled to said computation module, so that the at least one steerable antenna radiates or receives one or more beams in one or more directions while attenuating its radiation

pattern in said zones or spans of directions in the three dimensional space,

wherein said zones or spans of directions correspond with one or more directions or locations of said user or structure relative to said at least one steerable antenna in the three dimensional space,

wherein said at least one steerable antenna is adjusted in the adjusting step to steer or direct its radiation pattern in particular directions while attenuating the radiation pattern in other directions in the three dimensional space.

13. The method of claim 12 wherein said wireless device is selected from the group consisting of computers, telephones, portable computing or communication devices, games, wireless memory media, radio frequency identification tags, vehicles, clothing, personal data assistants, and navigation assistants.

14. The method of claim 12 further comprising tuning said at least one steerable antenna with one or more active or passive elements which are selected or interconnected using electronic control.

15. The method of claim 12 wherein said at least one steerable antenna is configured for transmitting, receiving, or transmitting and receiving simultaneously in a plurality of different bands.

16. The method of claim 15 comprising controlling tuning of a tuner for said at least one steerable antenna to operate in said plurality of different bands.

17. A wireless device, comprising:
one or more antennas; and
a plurality of transmitters, receivers or transceivers that operate in one or more frequency bands,

wherein at least one antenna of said one or more antennas is used by said plurality of transmitters, receivers, or transceivers in a plurality of different bands, and radiates or receives at one or more frequencies in the range of 10 GHz to 500 GHz.

wherein said at least one antenna is one or more of

- a) an actively tuned antenna, and
- b) tuned by one or more passive elements which are selected or interconnected using electronic control.

18. The wireless device of Claim 17, further comprising:
said at least one antenna of said one or more antennas that forms an adaptive antenna that adaptively alters its radiation pattern so as to attenuate radio energy transmitted to or received from particular zones or spans of directions.

19. The wireless device of Claim 17, further comprising:
said at least one antenna of said one or more antennas that forms an adaptive antenna that adaptively alters its radiation pattern so as to accentuate radio energy transmitted to or received from particular zones or spans of directions.

Electronic Patent Application Fee Transmittal

Application Number:	17346533			
Filing Date:	14-Jun-2021			
Title of Invention:	Steerable Antenna Device			
First Named Inventor/Applicant Name:	Theodore S. Rappaport			
Filer:	Michael E. Whitham/Walter Richardson			
Attorney Docket Number:	08610010C2			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with \$0 paid	2251	1	110	110
Miscellaneous:				
Total in USD (\$)				1020

Electronic Acknowledgement Receipt

EFS ID:	43731202
Application Number:	17346533
International Application Number:	
Confirmation Number:	5351
Title of Invention:	Steerable Antenna Device
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	164319
Filer:	Michael E. Whitham/Walter Richardson
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610010C2
Receipt Date:	10-SEP-2021
Filing Date:	14-JUN-2021
Time Stamp:	10:57:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1020
RAM confirmation Number	E202190A57540843
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2021-09-10_08610010C2_Msg PtsResp.pdf	40331 f6b977258b014393687d1c97f0ef3b0ff1b1ae8a	yes	6
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Applicant Response to Pre-Exam Formalities Notice		1	1	
	Claims		2	6	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	49101 c89bff5f5095e55b0c31d4d70d5bac3e6ac6b7c7	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			89432		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/346,533				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	350		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	0	minus 20 = *	x 50 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	0	minus 3 = *	x 240 =	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	830		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR 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		OR 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	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/346,533	06/14/2021	Theodore S. Rappaport	08610010C2

CONFIRMATION NO. 5351

FORMALITIES LETTER



164319
W&C IP
11491 Sunset Hills Road
Suite 340
Reston, VA 20190

Date Mailed: 06/25/2021

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The specification does not include at least one claim.
A complete specification as prescribed by 35 U.S.C. 112 is required.
Applicant must submit at least one claim. If more than 3 independent claims, more than 20 total claims, and/or a multiple dependent claim are submitted, excess claims fees are required at the time of submission of such claims (see 37 CFR 1.16(h)-(j)).
- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

- late submission of the basic filing fee, search fee, or examination fee,
- late submission of inventor's oath or declaration,
- filing an application that does not contain at least one claim on filing, or
- submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- \$ **80** basic filing fee.
- \$ **80** surcharge.
- \$ **350** search fee.
- \$ **400** examination fee.
- \$(0) previous unapplied payment amount.
- \$ **910** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

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

/twoldeyes/



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Alexandria, Virginia 22313-1450
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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
17/346,533	06/14/2021	2845	0.00	08610010C2		

CONFIRMATION NO. 5351

FILING RECEIPT

164319
W&C IP
11491 Sunset Hills Road
Suite 340
Reston, VA 20190



0000000126499478

Date Mailed: 06/25/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Theodore S. Rappaport, Riner, VA;

Applicant(s)

Theodore S. Rappaport, Riner, VA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 13/966,853 08/14/2013 PAT 11063625
which is a CIP of 13/713,804 12/13/2012 PAT 8593358
which is a CON of 12/541,764 08/14/2009 PAT 8350763
which claims benefit of 61/088,829 08/14/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

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: 06/23/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/346,533**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Steerable Antenna Device

Preliminary Class

343

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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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.

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UTILITY PATENT APPLICATION TRANSMITTAL <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	08610010C2
	First Named Inventor	T Rappaport
	Title	Steerable Antenna Device
	Priority Mail Express® Label No.	

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
--	---

1. ☐ Fee Transmittal Form (PTO/SB/17 or equivalent) 2. ☐ Applicant asserts small entity status. See 37 CFR 1.27 3. ☐ Applicant certifies micro entity status. See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent. 4. ☒ Specification [Total Pages <u>22</u>] Both the claims and abstract must start on a new page. (See MPEP § 608.01(a) for information on the preferred arrangement) 5. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>5</u>] 6. Inventor's Oath or Declaration [Total Pages <u>1</u>] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e)) a. ☐ Newly executed (original or copy) b. ☒ A copy from a prior application (37 CFR 1.63(d)) 7. ☒ Application Data Sheet * See note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent) 8. CD-ROM or CD-R in duplicate, large table, or Computer Program (Appendix) ☐ Landscape Table on CD 9. Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. – c. are required) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies	ACCOMPANYING APPLICATION PAPERS 10. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 11. ☐ 37 CFR 3.73(c) Statement ☐ Power of Attorney (when there is an assignee) 12. ☐ English Translation Document (if applicable) 13. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached 14. ☐ Preliminary Amendment 15. ☐ Return Receipt Postcard (MPEP § 503) (Should be specifically itemized) 16. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed) 17. ☐ Nonpublication Request Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 18. ☐ Other: _____ _____ _____ _____ _____
--	---

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS					
☒ The address associated with Customer Number: <u>164319</u> OR ☐ Correspondence address below					
Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	
Signature	/Michael E. Whitham/			Date	6/14/2021
Name (Print/Type)	Michael E. Whitham			Registration No. (Attorney/Agent)	32635

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STEERABLE ANTENNA DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part (CIP) of U.S. Patent Application No. 13/713,804, filed December 13, 2012, which is a continuation of U.S. Patent Application No. 12/541,764, filed August 14, 2009, now issued Patent No. 8,350,763, which further claims priority to U.S. Provisional Application Serial No. 61/088,829, filed August 14, 2008. The complete contents of all three references are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to wireless portable devices and particularly to improvements in transmitting and receiving electromagnetic signals at multiple frequency bands.

Background of the Invention

Today's wireless devices, such as laptops and computers that connect wirelessly to the cellphone network or internet must use antennas to transmit and receive wireless energy to and from the device. Today's cellphones and laptops typically require multiple antennas, each antenna designed for resonance or desired performance at a particular frequency band (such as cellular band, say in the 850 – 950 MHz band, the Bluetooth/WiFi band, say in the 2400 – 2490 MHz band, and so on). Computer makers and cellphone makers have difficulty with the mechanical design of their equipment, and spend a great deal of engineering time, research, and cost in manufacture for the bill of materials for the feedlines and connections between transmitter circuits, transceiver circuits, or receiver circuits and the antennas that are mounted to or housed in the wireless device casing. In some cases, antennas must be oriented in the flip up top of a

laptop or placed behind or in the display screen, and tiny coaxial cables run through the case hinges to the motherboard mounted below the keyboard. Similar problems exist with cellphones, and all devices generally must meet or exceed certain federal or wireless carrier-imposed requirements for radiation efficiency for a wide range of device orientations. It is envisioned that as wireless proliferates, cellphones and laptops will require more and more separate radio frequency bands in order to offer connectivity and competitive services. It is not inconceivable to eventually have wireless portable devices requiring 10 or more separate frequency bands, where the term “band” here means a particular wireless standard or service that is distinct from another. For example, standards such as IEEE 802.11a, 802.11b, 802.11g, 802.15a, 802.15.3.c, Cellular telephone (European, Asian, or US spectrum), Bluetooth, WiMax, and PCS all represent different bands, as they generally have different RF frequency band allocations assigned to them. In the future, RFID tags, vehicles, wireless post it notes, equipment, shipping containers, and even clothing may also suffer the issue of having to provide multiple antennas for different RF bands.

Today, there are many passive antennas solutions that have been published in the literature, such as, for example, the broadband planar antenna developed by Professor Chen at The University of Texas. Using Fractal programming (genetic algorithms), it is possible to do computer simulations that eventually create an antenna design that offers resonance for several different frequency bands. Such antennas generally are developed by using field solver programs, where the field solver is set to optimize an antenna structure for a particular antenna performance over a specified range of frequencies (for example, the field solver may be set to find an antenna structure that has a low return loss, S_{11} , of less than -13dB over the range of frequencies of 2.4 – 2.9 GHz and 5.1 – 5.8 GHz, in order to accommodate Bluetooth and WiFi 802.11a, 802.11b, and 802.11g). However, planar antennas, when designed by an optimization program or set of algorithms, without the use of active antenna tuning, may result in a larger antenna than what is feasible for a small package (e.g. a small handset or mobile device).

Recently, there have been some technical advances in active antenna tuning, some of which have been pioneered by Paratek Microwave in Nashua, NH. Using active lumped elements, such as tunable capacitors, it is possible to allow for the active tuning

of an antenna within a cellphone handset. Using electrically tunable capacitors, Paratek has pioneered a way to allow for active tuning of one or more cellphone antennas, as discussed in US patent 7,369,828.

In US patent 7,369,828 by Shamsaifar (owned by Paratek Microwave), the device can tune two different cellphone antennas for use on one of several bands of interest, where each distinct and separate antenna (one for high band and one for low band) has an active element that may be tuned. As described in U.S. Patent 7,369,829, a cellphone antenna is designed specifically for cellphone bands, since today's cellphones generally provide a small Bluetooth antenna, separate and apart from the cellular antenna. In U.S. Patent 7,369,829, there is described a method of transmitting and receiving RF signals from multiple frequency bands utilizing an electronically tunable multiple band antenna, comprising the steps of: providing a high band antenna with at least one voltage tunable varactor associated therewith, the high band antenna providing a first input to a controller; providing a low band antenna with at least one voltage tunable varactor associated therewith, the low band antenna providing a second input to the controller; and inputting control data to the controller and controlling a first bias voltage for biasing the at least one voltage tunable varactor associated with the high band antenna and a second bias voltage for biasing the at least one voltage tunable varactor associated with the low band antenna. By using a controller, the invention enables an antenna to be tuned.

The controller of the method in U.S. Patent 7,369,828 can use a DC voltage supply to provide the DC voltage needed to bias the voltage tunable varactors. The high band antenna of the method taught in U.S. Patent 7,369,828 can further comprise: a substrate; a patch element on the substrate; at least one voltage tunable varactor associated with the patch element; a DC bias point on the patch element; an RF input on the patch element; a temperature sensor; and a ground plane on one side of the substrate.

The low band antenna of the method taught in U.S. Patent 7,369,828 can further comprise: a substrate; a patch element on the substrate; at least one voltage tunable varactor associated with the patch element; a DC bias point on the patch element; an RF input on the patch element; a temperature sensor; and a ground plane on one side of the substrate.

In a more specific embodiment of a preferred method of U.S. Patent 7,369,829, the multiple band antenna is a quad band antenna and covers the following frequency bands and standards which only involve cellular telephone (cellular and PCS): 824-894 MHz; 880-960 MHz; 1710-1880 MHz; 1850-1990 Hz; GSM850; EGSM; GSM1800; and PCS 1900.

Paratek uses BST as a tunable dielectric material that may be used in a tunable dielectric capacitor. *Paratek Microwave*, Inc. has developed and continues to develop tunable dielectric materials that may be utilized in embodiments of the antenna tuners and tunable filters, and the tuners are not necessary limited to using BST material. This family of tunable dielectric materials may be referred to as Parascan by the company.

The term "Parascan" as used herein is a trademarked term indicating a tunable dielectric material developed by Paratek Microwave, the assignee of US patents 7,397,329 and 7,369,828, and the idea of tunable dielectric materials have been described in several patents. Barium strontium titanate ($\text{BaTiO}_3\text{-SrTiO}_3$), also referred to as BSTO, is used for its high dielectric constant (200-6,000) and large change in dielectric constant with applied voltage (25-75 percent with a field of 2 Volts/micron).

Tunable dielectric materials including barium strontium titanate are disclosed in U.S. Pat. No. 5,312,790 to Sengupta, et al. entitled "Ceramic Ferroelectric Material"; U.S. Pat. No. 5,427,988 by Sengupta, et al. entitled "Ceramic Ferroelectric Composite Material-BSTO-MgO"; U.S. Pat. No. 5,486,491 to Sengupta, et al. entitled "Ceramic Ferroelectric Composite Material-BSTO-ZrO₂"; U.S. Pat. No. 5,635,434 by Sengupta, et al. entitled "Ceramic Ferroelectric Composite Material-BSTO-Magnesium Based Compound"; U.S. Pat. No. 5,830,591 by Sengupta, et al. entitled "Multilayered Ferroelectric Composite Waveguides"; U.S. Pat. No. 5,846,893 by Sengupta, et al. entitled "Thin Film Ferroelectric Composites and Method of Making"; U.S. Pat. No. 5,766,697 by Sengupta, et al. entitled "Method of Making Thin Film Composites"; U.S. Pat. No. 5,693,429 by Sengupta, et al. entitled "Electronically Graded Multilayer Ferroelectric Composites"; U.S. Pat. No. 5,635,433 by Sengupta entitled "Ceramic Ferroelectric Composite Material BSTO-ZnO"; U.S. Pat. No. 6,074,971 by Chiu et al. entitled "Ceramic Ferroelectric Composite Materials with Enhanced Electronic Properties BSTO Mg Based Compound-Rare Earth Oxide". These patents are incorporated herein

by reference. The materials described in these patents, especially BSTO-MgO composites, show low dielectric loss and high tunability. Tunability is defined as the fractional change in the dielectric constant with applied voltage.

Using the idea of tunable capacitance, and following on the above listed prior art, Paratek Microwave has developed a technology called Adaptive Impedance Matching Models (AIMM) which it currently demonstrates on its website at worldwide web site paratek.com as able to adaptively tune antennas.

Agile Materials, a company founded in 1999 as a spinoff of University of California, Santa Barbara, has also developed tunable wireless components for multi-band systems. Agile has successfully commercialized its proprietary method to harness the unique properties of a thin-film ferroelectric capacitors, which may be tuned over at least an octave of frequency range. Agile employees produced patent 7,202,747, "Self Tuning Variable Impedence Circuit for Impedence Matching of Power amplifiers," as well as 7,012,483, "Tunable Bridge Circuit", both of which use a BST tunable capacitive material to affect a resonance change in a tuneable circuit. All of the aforementioned is known from the public prior art of record.

SUMMARY

The current invention uses one or more antennas, at least one of which can be used by multiple transmitters or receivers in different bands, thereby greatly simplifying the antenna structures in a portable wireless device, and greatly reducing the mechanical design complexity, the cost of bill of materials, and the variance in manufacturing of different devices of a particular model.

The current invention exploits the idea of active antenna tuning, but expands it greatly in a non-obvious way by applying the concepts to the situation of where multiple band transmitters, receivers, or transceivers must be used simultaneously in a wireless portable device. In cellphones today, since telephone call need only be made on one band at a time (either on High Band Cellular or Low Band Cellular, or 3G band, but not more than one at a time), US Patent 7,369,829 and other prior art have not contemplated the present invention, which allows a single antenna to be used for simultaneous

transmission (or reception) for multiple bands. The present invention greatly simplifies the mechanical design and layout of wireless portable devices by allowing multiple transmitter (or receiver) bands to simultaneously use one or more antennas for simultaneous multi-purpose use.

This invention allows an antenna, such as a patch or metal fixture or other type of conductive or non/semi-conductive element or elements mounted on or within a mobile or portable device, to be simultaneously fed and used by multiple transmitters, receivers, or transceivers on different bands. It is understood that the terms portable and mobile may be used interchangeably. The invention has application with all wireless devices whether mobile, portable or fixed. This invention exploits active tuning and matching for each of the feedlines to antennas, or may use a single antenna feedline to match a single or multiple antenna from multiple devices, using tunable technologies developed by Paratek Microwave, Agile, or others, as well as techniques described below, or by using signal processing in the RF or IF domains, as well. The invention also allows a steerable antenna within a wireless device to avoid radiating towards a person or object.

DESCRIPTION OF THE DRAWINGS

Figure 1 shows today's typical cellphone or laptop design, where different transceivers are connected to different antennas.

Figure 2 shows an embodiment of the present invention, where multiple transmitters are fed to a single antenna (it is understood that transmitters could also be transceivers, or receivers).

Figure 3 shows a more detailed embodiment of the present invention, where multiple transmitters may be fed to a single antenna using multiple feedlines and active antenna tuners, controlled by a controller, operates on the RF of each signal. (it is understood that transmitters could also be transceivers, or receivers).

Figure 4 shows another embodiment of the present invention, where multiple transmitters may be fed to a single antenna using a single feedline and a single active antenna tuner which is controlled by a controller.

Figure 5 shows yet another alternate embodiment of the present invention, where a multiband tuner provides matching from a single multiband transmitter (or transceiver or receiver) feedline (e.g. a single RF source) to a single multi-use multi-band antenna

Figures 6A, B, and C illustrate some of the possible examples and configurations of tuning elements and circuits used within a tuner, with active elements, or in a multiband transceiver.

Figure 7 shows a portable device with multiple antenna elements, where an antenna element is not activated when covered by a person's finger.

Figure 8 shows a portable device with a steerable antenna, where the beams formed by the steerable antenna avoid radiating toward the user of the device.

DETAILED DESCRIPTION

Shown in Figure 1 is an example of how cellphones or laptops or other wireless devices 10 are designed today. In general, different band transceivers (e.g., GSM cellular transceiver 12, Bluetooth transceiver 14, and ultrawideband transceiver 16) are connected to different antennas (e.g., cellular antenna 20, Bluetooth antenna 22, and UWB antenna 24) that must be affixed to, located within the packaging of the device, or included in the printed circuit boards of the device, thereby taking up space, feedline resources (e.g., feedlines 26), increasing the bill of materials, and adding complexity.

Figure 2 illustrates the basic idea of the present invention which can be implemented in fixed or mobile wireless devices 10 such as computers, telephones, portable computing or communication devices, games, wireless post it notes, wireless memory media, personal data assistants and navigation assistants. For the purposes of this disclosure, the term "mobile wireless device" may be used interchangeably with "portable wireless device" and "wireless portable device". One potential application of the invention is in the IEEE 802.11ad standard, where very high throughput wireless devices (e.g., 60 GHz carrier transmissions) may use one or more transmitters, receivers or transceivers to simultaneously provide capabilities in the existing 802.11a and 802.11b bands of 2.4 GHz and 5.8 GHz, as well as the 60 GHz spectrum. Instead of requiring different antennas for the different RF bands, the present invention allows for the use of a

single antenna 28 for multiple bands (or multiple antennas, at least one of which can be used for multiple bands, and at least one of which may be a steerable antenna, where a steerable antenna may steer or direct its energy in particular directions while providing nulls or dead zones in other directions, and may be used on one or more bands).. By providing the ability to use just a single antenna 28, the problem of mounting, locating, and feeding the antenna can be greatly reduced, so long as a desired antenna efficiency can be maintained for all bands of interest.

Figure 3 shows how the antenna efficiency can be maintained. By using individual RF tuners 30, 32, and 34, that may be based on Paratek's or Agile's technology, or any other active tuning method, such as Microelectrical Mechanical Systems (MEMS), or variable mechanical resonator technologies, or other active or passive methods known now or in the future, it becomes possible to provide a good impedance match for each of the transceivers 36, 38 and 40 shown in Figure 3. The key to proper operation is to also, while providing good matching, provide sufficient RF isolation so that the transmitters in other bands do not overload the front end receiver of a band that is receiving. Fortunately, RF filtering and overload protection is improving in commercially available wireless transceivers in various popular bands, so that overload protection may be offered within the wireless transceiver chip itself through the integrated circuitry. Where more isolation is required, the tuner for a particular band is adjusted to offer very high impedance S22 characteristics at the other bands that differ from the dedicated band of the tuner, so that there is little, if any energy returned to the desired transceiver (or transmitter, or receiver) of the particular band of the tuner. In addition, low cost LC circuits may be etched into and/or added on the circuit board during manufacture or otherwise made a part of the tuner circuitry in order to create an RF Trap for the other bands, at much less cost and reduced engineering than having to use separate antennas for each band.

Furthermore, it is possible to use band transceivers that offer different antenna ports for the transmitter and the receiver within a particular band, whereby the present invention is simply extended to where there are two antennas used – one that is used solely for transmission by the multiple bands, and another multiband shared antenna for the receiver that is located a sufficient distance away within the casing, or which uses

polarization diversity, or uses shielding or distributed antenna ideas within the case in order to reduce the RF overload from the transmitting antenna. The receiving antenna, for instance, might be mounted on the other side of the printed circuit board for the cellphone, or laptop, or RFID tag, or wireless post-it, or might be pitched at right angles in the casing, etc. It is also possible to use buffer amplifiers, tuned amplifiers, as well as tuned trap circuits for particular offending bands, that can act as filters to prevent RF from other multi-user band transmitters from leaking into the receiver portion of a particular band. Also, RF antenna switches, may be made inexpensively in an integrated circuit process in CMOS, GaAs, or other well known semiconductor technologies known now or the future. These capabilities which may be incorporated in the tuner as described below. It should be clear in this disclosure that the term “antenna” is not meant to be limiting to any particular structure, but rather is meant to represent all of the possible ways that a wireless portable device may allow for radiation and reception of electromagnetic energy from particular frequency bands of interest.

Figure 3 also shows a tuner controller 42, preferably digital in nature and which may be part of a computer or microprocessor circuit that also controls one or more of the transceivers (or transmitters or receivers) shown in the figure. The controller 42 provides the proper voltages, or more preferably, the digital control values that are used by the tuner in order to adjust the active elements of the tuner (e.g. the tunable capacitors, inductors, amplifiers, and to toggle switches). The digital decoding circuitry in the tuner is not shown here, but is known to be implemented in a number of ways using standard serial or parallel digital busses that interconnect integrated circuits within cellphones and laptops. Furthermore, the controller receives feedback from the tuner, or from other circuitry (not shown) with respect to VSWR, power, and proper functionality so that the controller may properly adjust, alter, initiate, and end its use of control signals (either voltages or data values sent over a serial data line or a bus) to the tuner. In the case of the tuner receiving digital signals from the controller, it is understood that the tuner would have its own processing that would allow for the digital interpretation of control signals such as to properly determine the necessary analog voltages or other signal adjustments needed to perform impedance tuning through adjustment of the active tunable elements of the tuner, so that it would be possible to sequentially or simultaneously tune one or more

of the tuners so that multiple bands may simultaneously transmit (or receive, or both) using the single antenna structure shown in the figure. The controller may be part of the overall portable device computing logic or controlling circuitry, or may be integrated within one or more of a particular band or multiband transceiver, transmitter, or receiver. The controller may be distributed within the portable device, and may even be responsive to over the air signaling that is received by one or more of the transceivers. The controller would have awareness of when particular bands were to be transmitting, receiving, or in the idle/off mode, so that it could properly control the active elements, and even provide power on/off/sleep instructions to the circuitry within the tuner. Note that nothing here is meant to be limiting in how the controller might be used, as it is conceivable that it could be included in the circuitry of the tuner, or the tuner and controller ideas contemplated here all could be integrated within a single multiband transceiver chip, such as is shown in Figure 4.

Figure 4 shows an alternate embodiment, where the progress in IC design for wireless multiband, multi-mode circuits is contemplated. Indeed, today it is possible to purchase multi-band transceiver chips for popular wireless standards where different antenna ports are provided for various RF output bands. Figure 4 illustrates the use of a combined multiband transceiver 44 which may include, for example, GSM, Bluetooth, UWB, WiMAX all on one chip—eventually software designed radio may be a part of the chip). The present idea, shown in Figure 4, using a single RF feedline to a single multiband active controller, would provide an advantage to the wireless industry through simplicity and reduced feedlines, reduced size and weight, and more flexibility in locating the antenna. The multiband tuner 46 would require greater complexity than as shown in Figure 3, as it would require the ability to simultaneously pass desired RF signals at proper low (generally 50 ohms to 600 ohms) impedance for each of the bands that are being used, while providing very high impedance to other bands. The tuner is adjusted by the controller in order to indicate when a particular transmitter on a particular band is in the transmit mode or in the receive mode, or, alternatively, the tuner could simply offer matching capabilities to a transmitter to the antenna without consideration for the receiver (for the case where the receiver would be connected to a different antenna). The circuitry of the tuner is described in more detail below, and can exploit

buffer amplifiers or tuned RF amplifiers at various RF frequencies to provide isolation, as well as antenna switching, all contained within the tuner, making it possible to create a low cost, high performance antenna tuner chip for the present application. An optional RF switch allows separate transmitter path and receiver path tuning for each of the bands at use. This concept may be included within a single band tuner element for the present invention.

Figure 5 illustrates a more detailed example of the active and passive circuitry of the present invention. To provide a single feedline to a single antenna, the tuner 46 requires controller circuitry that provides instructions as to how the particular active devices may be adjusted. In this case, the term active indicates that RF tuning is possible, such as in the case of tunable capacitors or tunable inductors. Figure 5 shows an example, not in any way meant to be limiting to the type of impedance matching circuits 48 contemplated here, where the capacitors of each of three parallel band tuners are able to be tuned. Tuning methods for capacitors are well known, such as taught in the prior art patents by Paratek, and by researchers throughout the world. Similarly, it is possible to tune inductances, as well. Furthermore, shown in Figure 5, it is noted that RF amplifiers, that may be used to either offer matching impedance at the input (say 50 ohms) and particular desired impedance at the output feedline to the antenna, is shown. It should be clear that RF amplifiers, as shown in Figures 5 and 6, may either be strict buffer amplifiers with a very high output impedance, or alternatively, may be active devices that have a controlled impedance that is adjusted in tandem with the tuned circuit elements shown in the figures. Figure 5 represents an example of how multiband transmitted signals may be applied to a single multiband tuner. The input signals are split and routed to each of the respective tuner circuits, and may use a Wilkinson or simple ohmic splitter, which may implemented either on a printed circuit board substrate or within an integrated circuit. It is clear to one skilled in the art that tuner circuits and feedlines may be implemented in a myriad of ways depending on the particular physical structure of the circuitry. For example, coplanar waveguides or microstrip lines may be used in integrated circuits or circuit boards, and splitters, combiners, couplers, mixers, and switches may be fabricated to realize the invention using well understood techniques such as taught in D. Pozar's books Microwave Engineering, copyright 2004, and Microwave

and RF Design of Wireless Systems, copyright 2000 which are hereby incorporated by reference, and as presented at various IEEE conferences on antennas, microwave theories, and circuits.

While techniques for building both active and passive circuits are taught at various conferences, the use of such technology for the present invention has not been heretofore contemplated. It is well understood that a wide range of active and passive components, either lumped or distributed, may be combined with various transmission line and active and passive signal coupling techniques to implement the invention.

Figures 6A, B, and C illustrate some of the possible configurations of tuner elements for use in a multiband transceiver. It should be understood that these are representative, and other combinations of lumped or distributed circuits are possible, where the proper choice would depend on the type and structure of single antenna to be used, the electrical specifications and impedance matching/antenna port/isolation capabilities of the transmitter, receiver, or transceiver chips being used in the portable device, as well as cost, bill of materials, and the type of mounting to be used for the tuner circuitry. That is, an integrated circuit tuner might be more likely to pick adjustable capacitors over adjustable inductors in some instances.

Note in Figures 6A, B, and C that there are optional RF switches, that may be implemented in integrated circuit form within the tuner circuitry, that can be controlled by the controller to position properly for either transmit or receive operation. The transmitter configuration would exploit the left side of each of the depicted tuners, with a path providing matching to the single antenna structure, where the right side of each depicted tuner would be used for matching provided on the receive path. The switch would be controlled by the controller, or by some other means, such as from a master controller of the wireless device, the transceiver chip, or some other logic that instructs the particular transmitter in the particular band to transmit. Alternatively, the switches could be controlled by RF sensing, whereby the presence of sufficient level of RF from the transmitter (transceiver) chip causes the switches at the top and the bottom of the depictions to throw properly.

The active (tuned) elements shown in Figures 6A, B, and C, suggest that one or more tuned elements may be used in a tuner as disclosed here. For example, one method

would only use tunable capacitors, which are available from Paratek Microwave. Other embodiments would use both tunable capacitors and tunable inductors, and still others may use a combination of tunable and fixed elements in order to provide antenna tuning of a particular band to a single antenna while providing sufficient RF isolation/rejection of unwanted bands.

For simplicity, the controller signal in the circuitry shown in Figures 6A, B, and C is omitted, but it should be clear that such signaling capability exists. Other features have also been omitted, such as temperature sensors to determine proper electrical characteristics and calibration of the tuned elements, feedback circuitry (to sense proper VSWR, impedance, or acceptable power transfer, sufficient isolation), but these concepts are well understood by those skilled in the art.

It should also be clear that optimization algorithms that determine the values of multiband tuners so as to properly determine each of the active element positions could be performed by the controller as depicted in this invention disclosure. The optimization could use pre-set or memorized settings from recent or long term histories of proper tuning values, or could determine, on start up of the wireless device, appropriate values for the settings of each tuner elements. Such computation techniques, to determine a matrix of various values in a multidimensional problem, are well known and are varied. The use of memory to remember preset values for various use cases, and to store new or recent or past settings of tuner elements, in order to allow the invention to be used in a power efficient and reliable manner is contemplated here, although memory is not shown in the drawings. These techniques are well understood in the art.

In addition to the active tuned elements shown in Figures 6A, B, and C, it is possible to implement the invention using other frequency selective approaches, such as reasonably high-q passive circuits (with or without amplification), or using metamaterials or transmission line implementations which may be embedded within one or more semiconductor layers or substrates, or implemented in lumped element form, or through active and/or passive circuitry to provide the ability to provide either receiver or transmitter antenna tuning on multiple bands, as described above. Metamaterials are one way to create frequency selective surfaces and can provide good isolation, as described in the paper coauthored by L. Ragan, A. Hassibi, T. S. Rappaport, and C. L. Christianson,

entitled "Novel On-Chip Antenna Structures and Frequency Selective Surface (FSS) Approaches for Millimeter Wave Devices," IEEE 66th Vehicular Technology Conference (VTC), Baltimore, MD, Oct. 1 -3, 2007, pp. 2051-2055, and as described in US patent publication 20080238801 by Lawrence Ragan, both of which are fully incorporated here by reference. Such frequency selective structures and implementations, depending upon the particular implementation, may require amplifiers or may be of sufficiently low loss to obviate the need for amplifiers directly at the antenna tuner junction. The controller would cause various switches, devices, or series or parallel (or both) combinations of connections, or would otherwise support voltages or currents to be established in order to implement or select the desired tunability for these various possible implementations, it being understood that the controller could be designed to work in concert with various semiconductor properties, or with embedded, distributed or lumped circuitry within the RF stage or antenna interconnect stage, in order to affect the ability to use a single antenna on multiple bands.

As wireless devices begin to evolve to millimeter wave (mmWave) carrier frequencies above 10 GHz, say at 28 or 38 GHz, and even to frequencies in the 70 to 500 GHz range, and even to Terahertz frequencies, the need to integrate the tuning and interconnection of a single antenna to RF circuitry will become even greater. System on a chip (Soc) implementations of the invention described here will be highly desirable so that a single integrated circuit, with an embedded antenna on the integrated circuit (chip) or package or on the case or circuit board of a consumer device (such as a PC, cellphone, television, vehicle, etc.) may be used for several different frequency bands, or for different portions of a massively wideband spectrum allocation. For example, 60 GHz devices may well work from 58 to 65 GHz, and it will be desirable to implement the current invention across different portions of that band (e.g. the same antenna may need to be tuned for the 58 - 60 GHz portion of the band for one particular application or instance, and the 62-64 GHz portion of the band for a different application or instance, or may also be used to tune to the 77 GHz band or 5.1 - 5.8 GHz band for operations, as well.). Ultrawideband repeaters, such as described in US patent application 10/919,515, now issued Patent No. 7,676,194 to Rappaport, which is fully incorporated here by reference, could make use of this. It is understood that the controller may selectively^o

switch, exit, or cause voltages or currents or switches to be activated in any particular implementation, and that the single antenna may itself be designed to have certain desirable properties or preferential frequency responses at certain different bands, but which are further improved and made to more efficiently transfer power (e.g. reduce the Voltage Standing Wave Ratio, increase efficiency, tune for improved SNR, decrease power or current drain, or improve some other power transfer metric, all of which are examples of matching the antenna to the other circuitry including without limitation the transmitters, receivers, and transceivers) between the antenna and the transmitter and/or receiver through the disclosed invention.

Using the concepts of adaptive or steerable antennas of multiple elements, wireless communication systems and devices in the millimeter wave (mmWave) bands (for example, above 10 GHz in frequency, where directional antennas may be fabricated using antenna elements much smaller than used in today's 2 GHz cellphones) will be able to exploit the steerable properties of such antennas for improved performance and safety of the user.

In future mmWave communication systems, portable devices and/or fixed infrastructure, such as base stations, and/or "access points" or repeaters, or other infrastructure devices will use directional, steerable antennas for advantage. It is useful to steer radiation energy of a portable or fixed device away from a person's head, or body, or building or obstruction of some kind. This is desirable for at least two reasons. First, portable wireless devices should radiate away from a body of a person (or structure) because a body may often attenuate or interfere with an intended radiation signal of such a device. — It is often advantageous to radiate energy away from a person or structure such that that a path between the portable device and access point is clear of local obstructions. The second desirable reason is that it is generally desirable to radiate energy away from a person's head for safety or health considerations (for example, see: <http://hps.org/hpspublications/articles/rfradiation.html> regarding present day portable radio systems). By having a steerable antenna avoid radiating into a person or structure, safety precautions may be taken while enabling a more predictable signal strength.

In this invention, a smartphone or cellphone/computing device (herein called a "portable wireless device" or "wireless portable device", both terms being

interchangeable) uses one or more internal sensors to sense parameters indicative, for example, of how a person is holding the smartphone or cellphone/computing device, and adjusts the transmission beam pattern to ensure that the primary energy radiated by the portable wireless device is radiated away from the person using the portable wireless device.

Sensing of the parameters of the portable wireless device which may be used to ensure energy is radiated from the portable wireless device, e.g., away from the user, may be accomplished in many ways using one or parameter sensors 29, e.g. Figure 2, which are built in, added on, or are otherwise associated with the portable wireless device. The choice of sensor 29 and location can vary widely and may include, e.g., without limitation, cameras, heat sensors, gyroscopes, light detectors, capacitive detectors (including capacitive elements of a capacitive touch interface of a portable wireless device), microphones, and ultrasound sensors or transducers.

One method is to use a sensor such as a built in camera, used by a portable wireless device (e.g. smartphone or cellphone/computing device) to sense the presence of one or more persons. Having information as to the presence and relative location of a user or a user's body, and/or other surroundings, an antenna system of the portable wireless device can steer away from the detected user and/or other surroundings a primary beam or beams formed by the portable wireless device to avoid radiating the user.

Pattern recognition, facial recognition, or the use of the camera to sense hair, skin, body parts (such as eyes or ears, or heads, or arms), or clothing may be used to steer a beam or beams away from a user. The geometry of the portable wireless device, including the camera or cameras in the device, their locations and orientation on the device itself, and the physical orientation of the antenna may be used in determination of a direction to steer a beam or beams. Patterns for adaptive antennas may be controlled using a wide range of electrical switching, phasing, or selecting techniques known in the art and described elsewhere in this specification to enable pattern adjustments in two and three dimensions. Since a human being moves at a much slower rate than adaptive antennas can beamform or steer beams, antenna beam patterns may be adjusted in real time (at least as fast, and actually much faster, than as a person moves) to maintain a primary beam or beams radiating away from a user during continued use of the portable

wireless device. Note that multiple cameras on the device may be used to determine approximate distances of a user from the device (as can other methods and systems described below), which may be used to then determine fields of view or zones or spans of directions where energy should not be radiated by a steerable beam of the device.

By using simple geometry calculations, accounting for the camera's field of view (used to sense the human user and/or the user's body parts or clothing, etc.) and the orientation of the antenna elements in a portable wireless device, a zone or span of directions can be computed by the device (using a "beamformer" or "beamsteering" or "beam selection" approach, which may be implemented in software within the device, e.g. a computation module, or on a specialized processor or generalized processor such as processor 27 in Figure 2, along with antenna and RF front end hardware to actuate the desired radiation pattern from antennas in the device, where computer algorithms are used to select proper hardware settings for desired beam patterns) to know where not to transmit energy, and the beamforming algorithms (which may include beam or antenna element selection, adaptive beamforming, beam selection, multibeam combining, mimo, phasing, etc.) may be adjusted to ensure that a primary energy is radiated away from the zone or span of directions.

In addition to camera sensors, other parameter sensors such as gyroscopes, light detectors, heat detectors, or capacitance detectors may be used to sense how or where a person is holding a device, moving a device, and may give indications as to where the device is oriented, so that the beamforming or beamsteering algorithms or approaches may, for example, radiate energy away from a human user. A gyroscope may be used, for example, to determine when the phone is being moved and signal the device to begin computing new orientations that would be applied to the beamformer, so that new zones of avoidance may be computed, such that an antenna beam or beams may be pointing away from the user as the device is moved.

Light detectors may be used to determine intensity of light to which a wireless portable device is exposed. When a wireless portable device is pressed up to a person's head, for example, the device may sense the difference between the head, and the hand, which may not completely cover the device. This difference, through preset or learned calibration routines, allows the wireless portable device to determine an orientation of

the device relative the user's body, and resulting computation by the device involving estimation of the user's location may be fed to or used by the beamformer to allow the beamforming operation to compute, and recompute (as the device is moved, or in a periodic or non periodic fashion during transmission) primary beam directions that would avoid zones where the user is estimated to be.

One or more heat detectors may be used to determine how a human is holding a wireless portable device, how hands are positioned on the device, by sensing around a case of the device. Such heat detectors may be used explicitly for detecting thermal radiation to which an exterior of the portable wireless device is exposed, and not for detection of thermal conditions inside the device, such as monitoring of circuitry temperature and overheating prevention. Heat detectors may also determine approximate distance of a human user's body from a device, by sensing a difference between ambient temperature and temperatures on different sides of the device. Using this approach, the device may determine, either alone or with other sensor inputs (e.g. sensor fusion, such as with cameras, or other sensors) where the user is located relative the device, and in particular the device's antennas. Information from one or more heat sensors and one or more other sensor inputs may be used computationally to determine special orientations of the user, and then the beamforming operation can use the computational outputs to allow the antenna beam or beams to be directed such as to radiate away from the user.

Similarly, one or more capacitive devices may be used to sense touch and/or proximity of a user's skin to a portable wireless device, and either alone or with sensor fusion, the portable wireless device can determine how to orient the one or more beams of the device to avoid radiating in the direction of the user.

Sensors may also include audio sensors or microphones, ultrasound transducers, or ultrasound range finders or sensors, working alone or in concert with other sensors (i.e. sensor fusion), or with multiple types of the same sensor, to provide stereoscopic or differential measurements to determine distance ranges between a portable wireless device to parts of a human body, or the presence of fingers or hands on the case or display of the portable wireless device to determine if certain antennas should even be used (e.g to avoid radiating when a finger or palm or head is directly over one or more antennas).

Note that beamforming operations may also be used to simultaneously find the best or sufficient beam pointing directions to ensure a link between the transmitter and receiver, while still avoiding radiation of energy toward a human user. It should be noted that for receiving signals, the same beam arrays used for transmitting might be used to point in a different direction (for example, on receive, the beam array may wish to point at a human user to pick up reflections off of the human body). In future mmWave wireless systems, time division duplexing may be likely, since the transmitter-receiver distances will likely shrink to a few hundred meters, allowing antenna arrays to be used partially for transmit and partially for receive, in a time division duplexed fashion, thereby allowing a device to provide different beam patterns on transmit than on receive. It is understood that as future mmWave wireless standard evolve, the beamforming computations need to be made within a time frame between successive time division transmissions. Thus a portable wireless device would need to be able to use sensory information to determine spatial zones of avoidance of the beamforming process, so that the computations and recomputations (as the device is moved) in a periodic or non periodic fashion between transmission slots (as indicated by the wireless standards created for mmWave wireless systems), or at least at a rate much less than the movement of humans, so as to ensure that the primary beam directions would avoid the zones where the human would be estimated to be by the wireless portable device.

Figure 7 shows an example of how sensors 70 may be used with a wireless portable device (e.g. phone or tablet 71) to determine the proximity of, for example, a hand and fingers 73 of a person 74 as the device is being held. Multiple embedded antenna elements 75 are usable to provide a steerable antenna beam. Sensors 70 detect one or more parameters which cause detection of the user's fingers 73 gripping a top left portion of the tablet 71. For example, a heat sensor 70B in an edge of the tablet or capacitive elements integral with display 77 detect the heat from and contact of fingers 73 with the tablet 71. Accordingly, antenna element 75B (shown in dashed lines as being under the user's fingers) which is covered by a human finger is not activated and accordingly does not radiate outward from the face of the tablet. The configuration shown in Figure 7 is simply an example. It should be understood that the number and configuration of sensors 70 and antenna elements 75 may vary from one device to

another, and sensors and antenna elements may be combined with one another, as with sensor antenna/combination 75C, and/or with other circuitry or hardware elements of a portable wireless device 71.

Figure 8 shows a person 74 holding a wireless portable device (e.g. a tablet 71). Sensors 70, which may be integral with, affixed to, or otherwise configured with tablet 71, collect data concerning the tablet's environment and state. The proximity, distance, and direction of a surrounding, such as person 74 and parts of his or her body, in three dimensional space relative the device can be estimated or determined, and the radiated antenna patterns/beams 80 of the device are steered or otherwise directed away from person 74 or any other detected person or structure by modulation and control of the radiation pattern of antenna elements 75. Antenna element 75B (shown dashed as being under the user's hand) is detected as being covered by fingers 73 and is deactivated, preferably until no obstruction by a person or part of a person or structure is detected. As a result, the user's fingers 73, as well as the user's body (i.e. torso, head, etc), are not radiated by energy from the antenna elements.

The above systems and methods for steering the beams away from a user, parts of a user's body, or one or more objects, may be implemented in a single band, or multiple bands, and may be used with a wide variety of devices, with one or more sensors, multiple screens, and for use in wireless communication systems where antenna beams may be formed by multiple antenna elements, preferably at mmWave frequencies at or above 10 GHz. "Avoidance zones", to ensure primary radiation away from a human user, may be one or more directions, or zones or angles that are computed by a device.

It should be clear that other sensors, not yet developed, could also be used to allow a wireless portable device to avoid radiating a human user, and such sensors could be used to follow the movements of the user to ensure the device could implement beamforming or beamsteering that continue to avoid radiating energy in the direction of the user or parts of the user's body. Also, all of the systems and methods described above may also be applied to fixed wireless devices and infrastructure used in wireless systems, as well, where repeaters or access points or base stations and the like would be deployed in or around dwellings, malls, or locations where humans are or move near. Similarly, to allow for rapid deployment of fixed infrastructure, the above approaches may be used to

allow fixed infrastructure to automatically steer beams in a manner to avoid buildings, structures, or objects that could otherwise interfere with a more desired or optimal beam pattern.

It should be evident that the invention contemplated here, while described as a single antenna, may itself be implemented with other antennas or antenna elements or sub elements to form an antenna array, including for use in a MiMO system or beam switchable array, and that the disclosed invention with single antenna which may have one or more elements or antennas and which may be implemented in a lumped or distributed or passive or active or hybrid manner, and may be used in conjunction with other antennas in various switching, phasing, or active or passive combining techniques to form a larger or distributed antenna structure that also works over multiple frequencies. The invention extends to components such as the tuner and/or controller for implementing the invention. For example, tuners or sets of tuners which are connectable or coupled to multiple transmitters, receivers, or transceivers for allowing the simultaneous transmission or reception at multiple frequency bands or the ability to use a single physical structure (e.g., an antenna) for transmission and reception of many different bands, or controllers or other circuitry for accomplishing the same form a part of this invention.

ABSTRACT OF THE DISCLOSURE

Wireless devices, and particularly mobile devices such as cellphones, PDAs, computers, navigation devices, etc., as well as other devices which transmit or receive data or other signals at multiple frequency bands utilize at least one antenna to transmit and receive and a plurality of different bands (e.g., GSM cellular communication band; Bluetooth short range communication band; ultrawideband (UWB) communications, etc.). These wireless devices can simultaneously transmit or receive at a plurality of different bands, or simultaneously transmit and receive at different bands. The wireless devices have the ability to use a single physical structure (e.g., an antenna) for transmission and reception of many different bands. The antenna can be either actively tuned or passively tuned using one or more elements. The antenna may comprise a plurality of antenna elements or antennas, and at least one antenna may be a steerable antenna.

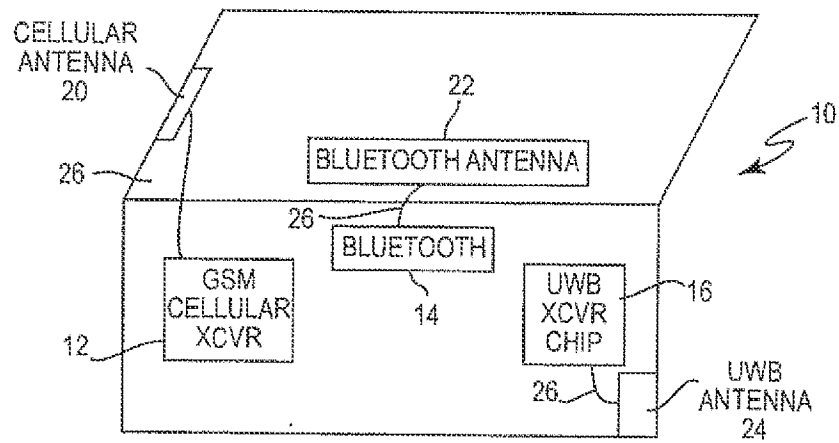


Figure 1

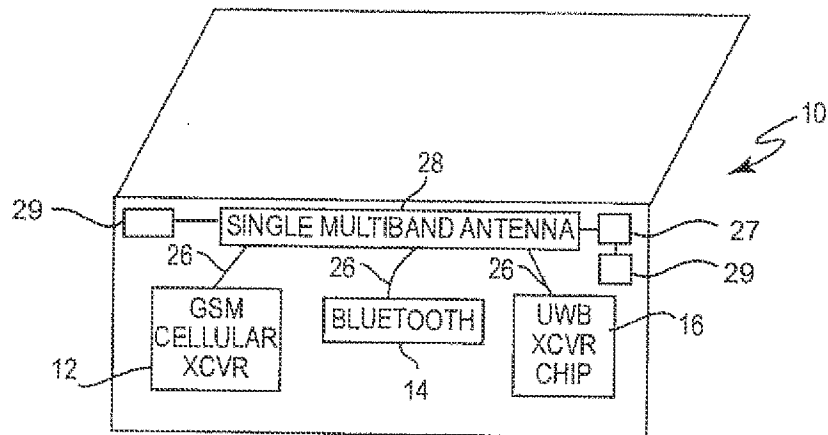
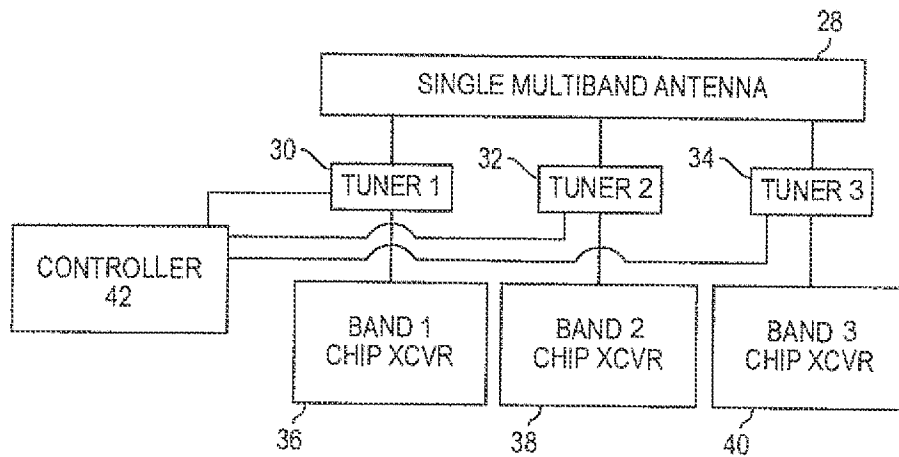
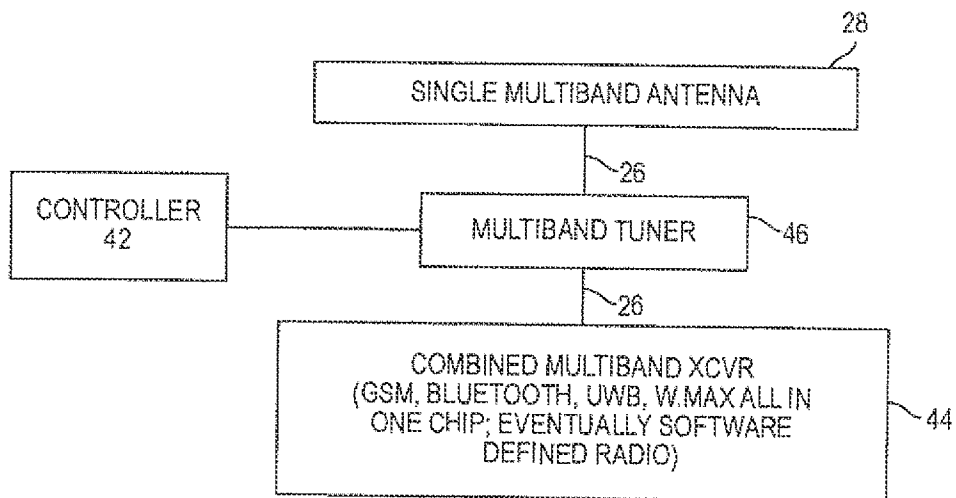


Figure 2

*Figure 3**Figure 4*

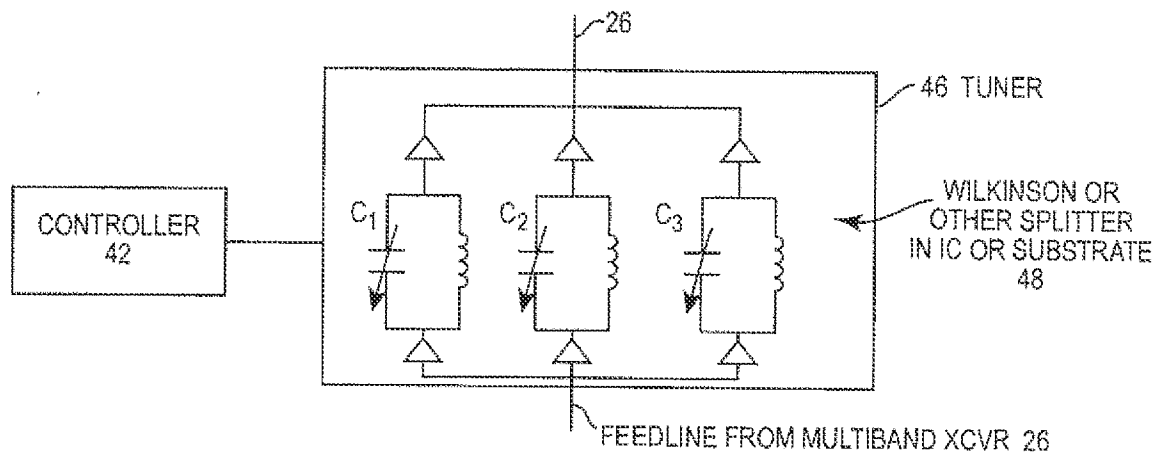


Figure 5

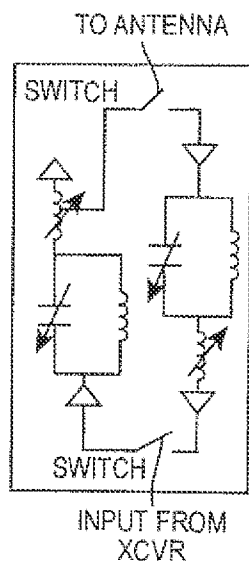


Figure 6A

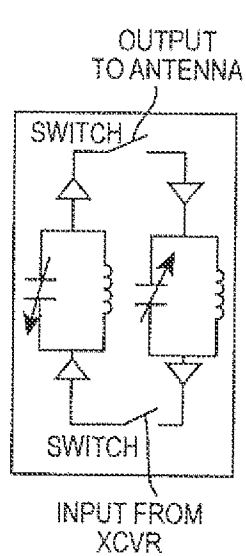


Figure 6B

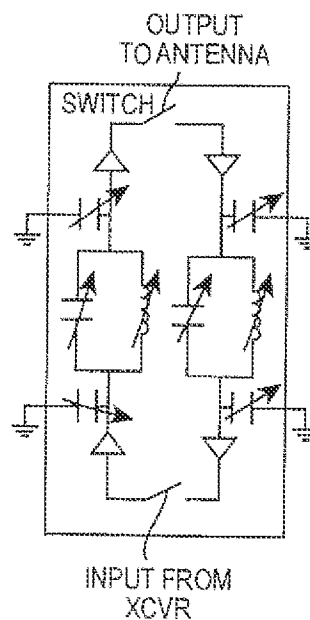


Figure 6C

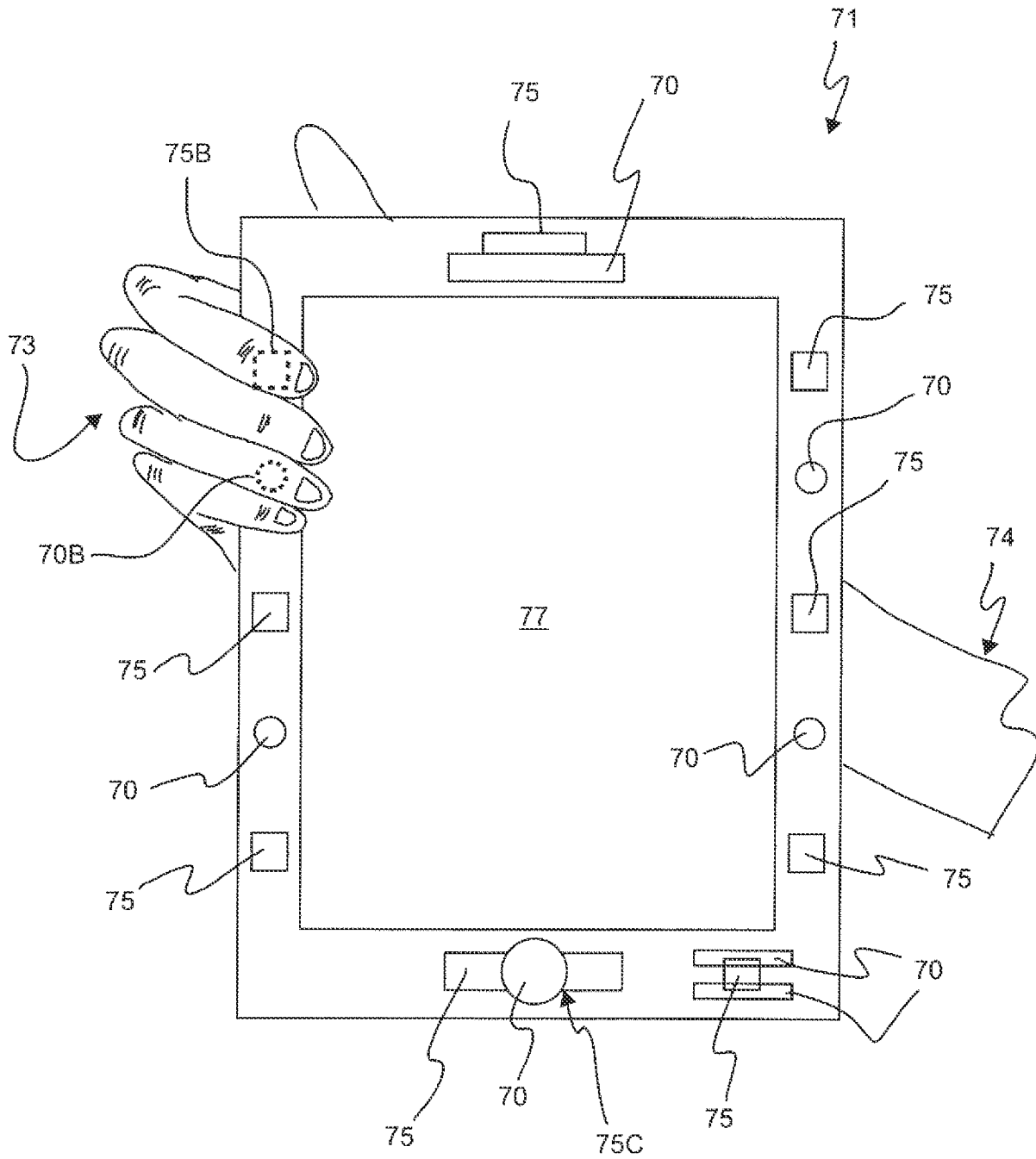


Figure 7

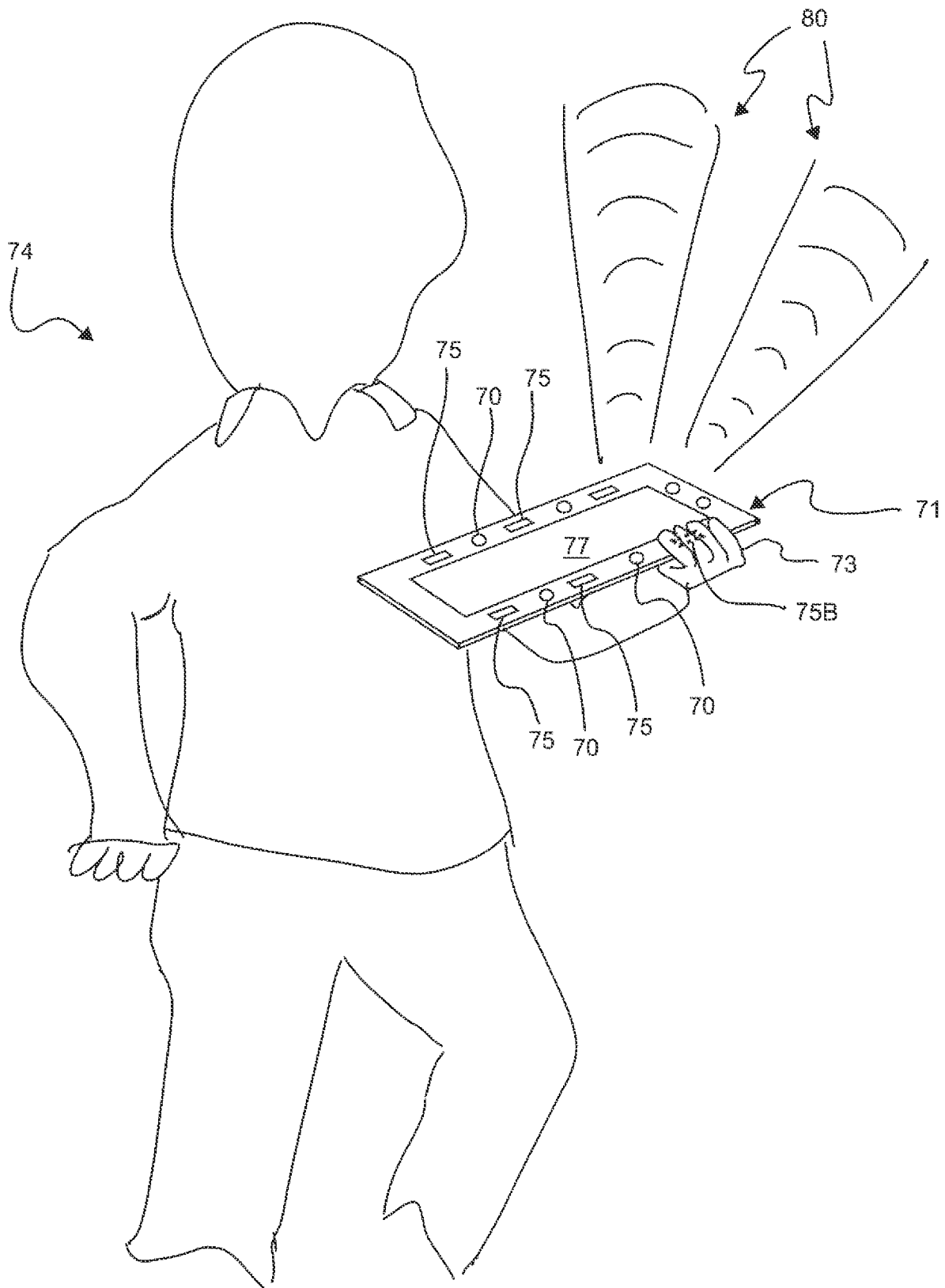


Figure 8

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of
Invention

Steerable Antenna Device

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number _____

filed on _____

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

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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

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

LEGAL NAME OF INVENTOR

Inventor: Theodore S. Rappaport

Date (Optional):

Aug 14, 2013

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	08610010C2
		Application Number	
Title of Invention	Steerable Antenna Device		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

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

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Theodore	S.	Rappaport			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
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☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	164319		
Email Address	action@wcc-ip.com	Add Email	Remove Email

Application Information:

Title of the Invention	Steerable Antenna Device		
Attorney Docket Number	08610010C2	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	08610010C2
		Application Number	
Title of Invention	Steerable Antenna Device		

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:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	164319		

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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.					
Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)		
	Continuation of	13966853	2013-08-14		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13966853	Continuation in part of	13713804	2012-12-13	8953358	2013-11-26
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13713804	Continuation of	12541764	2009-08-14	8350763	2013-01-08
Prior Application Status	Expired	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)		
12541764	non provisional of	61088829	2008-08-14		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					Add

Foreign Priority Information:

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	08610010C2
		Application Number	
Title of Invention	Steerable Antenna Device		

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

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

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

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

Authorization to Permit Access:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	08610010C2
		Application Number	
Title of Invention	Steerable Antenna Device		

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

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

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

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Applicant	1	Remove
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Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor :		
If the Applicant is an Organization check here. ☐		

Prefix	Given Name	Middle Name	Family Name	Suffix

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	08610010C2
		Application Number	
Title of Invention	Steerable Antenna Device		

Mailing Address Information For Applicant:			
Address 1			
Address 2			
City		State/Province	
Country ⁱ		Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. Add			

Assignee Information including Non-Applicant Assignee Information:

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

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
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If the Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Non-Applicant Assignee:				
Address 1				
Address 2				
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Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee Data may be generated within this form by selecting the Add button. Add				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	08610010C2
		Application Number	
Title of Invention	Steerable Antenna Device		

Signature:

Remove

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

Signature	/Michael E. Whitham/			Date (YYYY-MM-DD)	2021-06-14
First Name	Michael	Last Name	Whitham	Registration Number	32635

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

EFS ID:	42976241
Application Number:	17346533
International Application Number:	
Confirmation Number:	5351
Title of Invention:	Steerable Antenna Device
First Named Inventor/Applicant Name:	Theodore S. Rappaport
Customer Number:	164319
Filer:	Michael E. Whitham/Walter Richardson
Filer Authorized By:	Michael E. Whitham
Attorney Docket Number:	08610010C2
Receipt Date:	14-JUN-2021
Filing Date:	
Time Stamp:	13:06:29
Application Type:	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	Transmittal of New Application	2021-06-14_08610010C2_Transmittal.pdf	280010 481d70ea9f1552d1be918b09e5394948a947e52a	no	2

Warnings:

Information:					
2		2021-06-14_08610010C2_Application.pdf	2118146 4454a0108fd9e196670b531622ab4eb747e48f4	yes	28
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	21	
	Abstract		22	22	
	Drawings-only black and white line drawings		23	27	
	Oath or Declaration filed		28	28	
Warnings:					
Information:					
3	Application Data Sheet	2021-06-14_08610010C2_ADS.pdf	1107438 126c99335327e3ccc26e5d2dd3786b74388a0a02	no	7
Warnings:					
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Total Files Size (in bytes):			3505594		
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