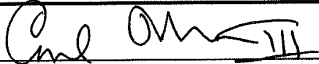
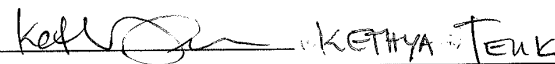
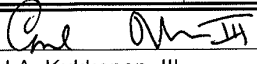


CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)			
First Named Inventor:	Donald B. Eidson	Nonprovisional Application Number (if known):	Not Yet Assigned
Title of Invention:	Directed MIMO Communications :		
APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION. 1. The processing fee set forth in 37 CFR 1.17(i), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, examination fee, and any required excess claims and application size fees are filed with the request or have been already been paid. 2. The application contains or is amended to contain no more than four independent claims and no more than thirty total claims, and no multiple dependent claims. 3. The applicable box is checked below: I. ☒ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1) i (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web. ---OR--- (b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper. ii An executed oath or declaration under 37 CFR 1.63 is filed with the application. II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2) i. A request for continued examination has been filed with, or prior to, this form. ii. If the application is a utility application, this certification and request is being filed via EFS-Web. iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371. iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination. v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).			
Signature 		Date April 13, 2012	
Name (Print/Typed) Carl A. Kukkonen, III		Practitioner Registration Number 42,773	
Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below*.			
☐ *Total of <u>1</u> forms are submitted.			
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UTILITY PATENT APPLICATION TRANSMITTAL (ONLY FOR NEW NONPROVISIONAL APPLICATIONS UNDER 37 CFR 1.53(B))	Attorney Docket No. 43273-513F01US	
	First Inventor Donald B. Eidson	
	Title DIRECTED MIMO COMMUNICATIONS	
	Express Mail Label No.	

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
1. ☐ Fee Transmittal Form (e.g., PTO/SB/17) 2. ☒ Applicant claims small entity status. See 37 CFR 1.27. 3. ☒ Specification [Total Pages <u>23</u>] Both the claims and abstract must start on a new page (For information on the preferred arrangement, see MPEP 608.01(a)) 4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>5</u>] 5. Oath or Declaration [Total Sheets <u>3</u>] a. ☒ Newly executed (original or copy) b. ☐ A copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 18 completed) i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). 6. ☒ Application Data Sheet. See 37 CFR 1.76 7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix) ☐ Landscape Table on CD 8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. - c. are required) a. ☐ Computer Readable Form (CRF) b. Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies 18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76: ☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____ Prior application information: Examiner _____ Art Unit: _____	ACCOMPANYING APPLICATION PARTS 9. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee 10. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney 11. ☐ English Translation Document (if applicable) 12. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached 13. ☐ Preliminary Amendment 14. ☐ Return Receipt Postcard (MPEP 503) (Should be specifically itemized) 15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed) 16. ☐ Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 17. ☒ Other: Certification and Request for Prioritized Examination (1 page)

19. CORRESPONDENCE ADDRESS			
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Dated: April 13, 2012	Signature:  KETHYA TEUK

DIRECTED MIMO COMMUNICATIONS

FIELD

[0001] The subject matter described herein relates to multiple-input multiple-output (MIMO) wireless communications and beamforming antennas.

BACKGROUND

[0002] Multiple-input multiple-output (MIMO) wireless communication systems utilize multiple transmit antennas and multiple receive antennas instead of a single antenna. MIMO systems often have multiple transmitters (e.g., one associated with each transmit antenna) and multiple receivers (e.g., one associated with each receive antenna). A transceiver may modulate transmit signals and demodulate receive signals and may perform further processing of receive signals after demodulation and of transmit signals prior to modulation.

[0003] Beamforming utilizes multiple antenna elements and often a beamformer to synthesize one or more beams. Such a beamforming antenna can be called an antenna array. Each antenna element of the antenna array is typically the same type of antenna.

SUMMARY

[0004] In one aspect, a system and an apparatus are disclosed that includes a plurality of m antenna arrays configured to receive a propagating radio frequency signal. Each antenna array includes a plurality of antenna elements and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements. The system includes a plurality of n multiple-input multiple-output transceivers (MIMO). Each MIMO transceiver

includes a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array. Each MIMO transceiver also includes a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission. m , n , v , and z are integer number values, and $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$. The system can have a value of $z = [\text{one value between } 1 \text{ and } n]$, or $z = 1, \dots, n$. The system can have $m=3$ and $n=6$.

[0005] The system can be configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+. The system can simultaneously provide MIMO and beamforming

[0006] The m antenna arrays can be separated by a distance more than one wavelength apart at the carrier frequency. The antenna elements can be less than or equal to one half wavelength apart at the carrier frequency. The beamformer can be an electronic beamformer. The antenna array may include a lens including a Honda or Rotman lens.

[0007] In another aspect is an apparatus including a plurality of m antenna arrays configured to receive a propagating radio frequency signal. Each of the antenna arrays include a plurality of antenna elements and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements. The apparatus also includes a plurality of n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th

beam of the i -th antenna array. m and n are integer number values, and $i=1, \dots, m$, and $j=1, \dots, n$.

[0008] In another aspect is an apparatus including a plurality of m antenna arrays configured to receive a propagating radio frequency signal. Each of the antenna arrays includes a plurality of antenna elements and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements. The apparatus also includes a plurality of n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission. m , n , v , and z are integer number values, and $j=1, \dots, n$, and $v=1, \dots, m$.

[0009] The current subject matter provides many advantages. For example, as described herein, MIMO and beamforming can be combined to provide range extension and throughput enhancement supported at either or both of a base station and mobile terminal. The resulting solution is practical and cost-effective.

[0010] The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Other features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0011] In the drawings,

[0012] FIG. 1 depicts an example of a block diagram of a transceiver for extended communications range and throughput using MIMO and beamforming;

[0013] FIG. 2 depicts an example of a block diagram of a receiver for extended communications range and throughput using MIMO and beamforming;

[0014] FIG. 3 depicts an example of block diagram of a time-division duplexing transceiver for extended communications range and throughput using MIMO and beamforming.

[0015] FIG. 4 depicts another example of a block diagram for a time-division duplexing transceiver for extended communications range and throughput using MIMO and beamforming; and

[0016] FIG. 5 depicts an example of a block diagram for a frequency-division duplexing transceiver for extended communications range and throughput using MIMO and beamforming.

[0017] Like labels are used to refer to same or similar items in the drawings.

DETAILED DESCRIPTION

[0018] FIG. 1 depicts an example of a block diagram of a transceiver for extended communications range and throughput using MIMO and beamforming. In this example, mobile terminals 102, 104 are in communications range with transceiver system 106. Two multi-beam antenna arrays 130, 140 each communicate with both mobile terminals 102, 104. Signals received from the mobile terminals and signals to be transmitted to the mobile terminals are processed by transceiver radio frequency signal conditioner (Tx/Rx RF signal conditioner) 150 and passed from/to MIMO transceivers 160 where the received signals are transformed into receive data and transmit data is transformed into transmit signals after signal conditioning by 150. User data to/from the transceivers flows from/to the user data processor 170.

[0019] Mobile terminals 102, 104 may be implemented as mobile wireless devices, although at any given time either mobile terminal may be stationary. Each mobile terminal may be referred to as, for example, a device, a user equipment, a mobile station, a mobile unit, a

subscriber station, a wireless terminal, a terminal, a tablet, a netbook computer, a laptop computer and/or any other wireless device. Moreover, each mobile terminal 102, 104 may also be implemented as, for example, a wireless handheld device, a wireless plug-in accessory, or the like. For example, the mobile terminal 102, 104 may take the form of a wireless phone, a computer with a wireless connection to a network, or the like. In some instances, the mobile terminal 102, 104 may include one or more of the following: at least one processor, at least one computer-readable storage medium (e.g., memory, storage, and the like), at least one user interface, and at least one radio access mechanism. Although FIG. 1 only shows one antenna for each of mobile terminals 102, 104, each terminal may have more than one antenna.

[0020] In some implementations, transceiver system 106 is part of a base station providing wireless access to a wireless local area network and/or a public land mobile network. For example, transceiver system 106 may be implemented as a cellular base station of a public land mobile network and/or as a wireless access device (e.g., a Wi-Fi wireless access point) providing access to a wireless network. Although transceiver system 106 is often located at a fixed location, transceiver system 106 can be mobile, moveable and/or transportable.

[0021] Antenna array 130 and/or antenna array 140 may receive a signal transmitted by another device, such as a mobile terminal, user equipment, mobile station, and the like. In some implementations, the received signal is configured in accordance with MIMO, although signals other than MIMO may be used as well. The received signal may also be configured in accordance with one or more wireless standards. For example, the received signal may be configured to substantially comply with a standard system specification, such as, for example, Institute for Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE),

3GPP LTE-Advanced, 3GPP LTE-TDD (time division duplexing), 3GPP LTE-FDD (frequency division duplexing), High Speed Packet Access (HSPA), HSPA+, and other commercial wireless standards, and/or proprietary standards. Moreover, the received signal may carry one or more of voice, video, images, data, control information, and any other information.

[0022] Antenna arrays 130, 140 each synthesize a plurality of antenna beams where each beam of an antenna array is designed to provide gain in a prescribed solid angle different from the other beams also synthesized by the same array. For example, antenna array 130, antenna array 140 may produce four beams each. In some implementations, transceiver system 106 is configured to allow communication between a mobile terminal and beams of antenna arrays 130, 140 with the same beam index. In the example of FIG. 1, beams 110(b) and 120(b) are configured to provide acceptable gain in the direction of mobile terminal 102. In this case, the index for the beam of both antenna arrays that is communicating with mobile terminal 102 is “b,” as shown in FIG. 1. Similarly, mobile terminal 104 is in communication with beams of index “c” of both antenna arrays 130, 140.

[0023] The number of beams produced by antenna arrays 130, 140 is a parameter determined by design of the array. Although FIG. 1 shows four beams per array, a greater or smaller number of beams is also possible. Also, although FIG.1 shows two antenna arrays, any practical number of arrays can be used limited by cost, available power, co-site interference, beam overlap, and the like.

[0024] Antenna arrays 130, 140 can be implemented in many different antenna technologies. For example, the individual elements of an array may each be a dipole antenna, monopole antenna, slot antenna, slotted waveguide antenna, horn antenna, microstrip patch antenna or any other antenna type. The antenna array 130, 140 may be configured with a

beamformer that provides fixed beams or steerable beams. Steerable beams may be electromechanically steered or electronically steered. Electronically steered arrays are sometimes referred to as phased arrays. The antenna array may further be coupled to a lens such as a Rotman lens or Honda lens (see, for example, U.S. Patent No. 6,980,169), and/or a polarizer. Some antenna arrays 130, 140 can incorporate a combination of steering mechanisms such as phased arrays that are electromechanically steered to a quadrant of space and electronically steered within the quadrant. Other combinations of the above elements are possible such as a lens that is electromechanically adjusted.

[0025] Tx/Rx RF signal conditioning 150 includes signal processing functions that may include filtering and amplification, and in some implementations may also include frequency upconversion and/or downconversion, and the like. These functions may be performed in the analog domain, may be performed digitally, or may be performed in a combination thereof.

[0026] Multiple MIMO transceivers are shown at 160. MIMO transceivers may perform digital signal processing associated with demodulation and decoding as well as modulation and encoding. In some configurations, there are as many MIMO transceivers 160 as beams supported by any one antenna. In this configuration, the number of antenna arrays is equal to the number of receive input and transmit output ports on each MIMO transceiver. Other configurations are also possible. Although Tx/Rx RF signal conditioning 150 and MIMO transceivers 160 are shown separately in FIG. 1, they may be combined into a single component or element.

[0027] Data processor 170 manages MIMO transceivers 160 and provides an interface such as an Ethernet interface to a network 180. Data may be sent from the network 180

to MIMO transceivers 160, conditioned by Tx/Rx RF signal conditioner 150 and then transmitted by antenna arrays 130, 140 or both, to one or more mobile terminals such as 102, 104. Similarly, one or more mobile terminals may transmit signals received by one or more of antenna arrays 130, 140, conditioned by 150, received by MIMO transceivers 160 and processed by data processor 170 for distribution to network 180.

[0028] FIG. 2 depicts an example of a block diagram of a receiver 200 for extended communications range and throughput with three antenna arrays 210, 220 and 230 and six MIMO receivers 250(a)-(f). Only the receive portion of a transceiver is shown in this example to simplify the description. In this example, each antenna array produces six independent beams 212(a)-(f), 222(a)-(f), and 232(a)-(f) although each antenna array 210, 220, 230 could produce a different number of beams. Antenna arrays 210, 220 and 230 may be comprised of antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h), respectively, as well as beamformers 216, 226, and 236. Although in this example each antenna array 210, 220, and 230 is comprised of eight antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h), different numbers of elements per array could be used. The six beams 212(a)-(f), 222(a)-(f), and 232(a)-(f) of each antenna array are synthesized by antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h), and beamformers 216, 226 and 236, respectively.

[0029] Each of the six beams of each antenna is associated with a corresponding signal 218(a)-(f), 228(a)-(f), and 238(a)-(f). MIMO receivers 250(a), 250(b), 250(c), 250(d), 250(e) and 250(f) are connected to beamformers 216, 226, and 236 such that beamformer output 218(a) corresponding to beam 212(a) is connected to MIMO receiver 250(a) at 240(a). Similarly, beamformer output 228(a) corresponding to beam 222(a) is connected to receiver 250(a) at 240(b), and beamformer output 238(a) corresponding to beam 232(a) is connected to

MIMO receiver 250(a) at 240(c). In the same fashion, beamformer output 218(b) corresponding to beam 212(b) is connected to MIMO receiver 250(b) at 241(a), beamformer output 228(b) corresponding to beam 222(b) is connected to MIMO receiver 250(b) at 241(b), and beamformer output 238(b) corresponding to beam 232(b) are connected to MIMO receiver 250(b) at 214(c). The same connection pattern is used for MIMO receivers 250(c), 250(d), 250(e), and 250(f) connected to 242(a)-(c), 243(a)-(c), 244(a)-(c), and 245(a)-(c) corresponding to beamformer outputs 218(c)-(f), 228(c)-(f), and 238(c)-(f) and beams 212(c)-(f), 222(c)-(f), and 232(c)-(f).

[0030] Although the diagram 200 of FIG. 2 depicts three antennas arrays 210, 220, 230 with six beams each connected to six MIMO receivers 250(a)-(f) that can accept three inputs each, any number of antennas connected to MIMO transceivers that can accommodate the same number of inputs as antennas could be used. There are an equal number of MIMO receivers as beams per antenna array. For example, four antennas with three beams each could be connected to three MIMO receivers each with four inputs. Similarly, two antenna arrays with three beams each could be connected to three MIMO receivers with two inputs each. In some implementations, multiple MIMO receivers are implemented on a single circuit card and/or in a single enclosure. In some implementations, one MIMO receiver may be capable of handling multiple receive channels simultaneously. The implementation of FIG. 2 is scalable to any number of beams provided the availability of MIMO processors that are capable of accommodating the antenna inputs. The number of inputs per MIMO receiver is sometimes referred to as its dimension.

[0031] The example system of FIG. 2 allows antenna arrays 210, 220 and 230 to be as far apart as practical, thus providing spatial diversity, while, at the same time, each antenna array 210, 220 and 230 supports beamforming by the design of antenna elements 214(a)-(h),

224(a)-(h), 234(a)-(h) and beamformers 216, 226 and 236. For example, the characteristics of beams 212(a)-(f) including beamwidth, gain and side lobe features, are determined by the type and design of each antenna element 214(a)-(h), the spacing between elements, and the beamformer 216. MIMO performance is enhanced by placing antennas 210, 220 and 230, a distance apart that is many times to many thousands of times (or greater) farther apart than the distance between elements of the array.

[0032] In some implementations, the antenna elements produce fixed beam directions that cannot be changed once the antenna is mounted and aligned. For example, the antenna arrays can be aligned so that the beams with the same index of antenna arrays 210, 220 and 230 point in the a direction that is parallel to each other. For example, beam 212(a) may be parallel to beams 222(a) and 232(a). Similarly, beams 212(b), 222(b), and 232(b) may point in parallel directions. If the distance to the mobile terminal being communicated with is sufficiently far, the same beam index of all three antenna arrays will provide sufficient gain to support communication. Using the same beam index for each antenna reduces the receiver complexity.

[0033] FIG. 3 depicts an example of a block diagram for a time-division duplexing (TDD) transceiver for extended communications range and throughput using MIMO and beamforming. In this example, the communications range may be increased by enabling one transmit beam at a time per antenna array allowing all of the radio frequency transmit power to be concentrated into one beam rather than spread-out over multiple beams. In operation, this is particularly useful when overall power is constrained by regulation such as in unlicensed bands (e.g. WiFi/802.11). The benefit is further enhanced in certain unlicensed bands for point-to-point transmissions where only one transmit beam is used.

[0034] In the example shown in FIG. 3, time-division duplexing (TDD) transceiver 300 extends the communications range and throughput with three antennas arrays 210, 220 and 230 and six MIMO transceivers 250(a)-(f). In this example, each antenna array produces six independent beams 212(a)-(f), 222(a)-(f), and 232(a)-(f) although each antenna array could produce a different number of beams. Antenna arrays 210, 220 and 230 are comprised of antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h), respectively, as well as beamformers 216, 226, and 236. Each antenna array 210, 220, and 230 is comprised of eight antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h), although a different number of elements per array could be used. The six beams 212(a)-(f), 222(a)-(f), and 232(a)-(f) of each antenna array are synthesized by antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h) and beamformers 216, 226 and 236, respectively. Each of the six beams of each antenna is associated with a corresponding signal 218(a)-(f), 228(a)-(f), and 238(a)-(f).

[0035] In this example, the corresponding signals 218(a)-(f), 228(a)-(f), and 238(a)-(f) are connected to transmit-receive (T/R) switches 310. The T/R switches 310 allow at any given time only a transmit signal or a receive signal to pass through the switch per antenna array. For example, the T/R switch corresponding to antenna array 210 may be set to transmit. In this case, a transmit signal is passed from switch 314(a) to antenna array 210 but no receive signal is passed through the T/R switch 310 at that same time. Whether the T/R switch corresponding to antenna array 210 is set to transmit or receive is independent of whether the T/R switch corresponding to antenna array 220 is set to transmit or receive, or whether the T/R switch corresponding to antenna array 230 is set to transmit or receive. For example, T/R switches 310 may be set to send a transmit signal to antenna array 210 at the same time T/R switches 310 are set to pass receive signals from antenna arrays 220, 230.

[0036] On one side of the T/R switch 310 are the six signals from each antenna array (e.g. 218(a)-(f)). In some time division duplexing implementations such as FIG. 3, each of the six signals 218(a)-(f) may be an input to an antenna array, a signal to be transmitted by the array; or an output of the antenna array, a signal received by the antenna array.

[0037] On the other side of T/R switches 310 are three groups of six outputs (received signals) leading to receive processing 316. Each group of six corresponds to received signals from one of the three arrays and the six signals in each group correspond to the six signals received from one antenna array, each one of the six corresponding to a signal from one of the six beams of a one antenna array. Each signal in the three groups of six receive signals, eighteen in total, is passed from the T/R switches 310 to a signal conditioning receive processor 316, each signal conditioning receive processor providing at least low noise amplification and signal filtering.

[0038] Each output from 316, 319(a)-(f), 320(a)-(f), and 321(a)-(f) corresponds to a different one of beams 212(a)-(f), 222(s)-(f), and 232(a)-(f). For example, signal 319(a) originates at beam 214(a) of antenna array 210. Similarly, the signal 320(d) originates at beam 224(d) and signal 321(a) originates at beam 234(a). Each group of signals connects to a receive bus. For example, signals out of receive processor 316 that correspond to antenna array 210 connect to bus R1 (326(a)). Similarly, signals corresponding to antenna array 220 connect to bus R2 (326(b)) and signals corresponding to antenna array 230 connect to bus R3 ((326(c)). Bus R1 is configured to distribute the signals from the beams of antenna array 210 to one receive input of each MIMO transceiver 328(a)-(f). For example, bus R1 connects signal 319(a) to the receive input of MIMO transceiver 328(a) labeled Rx 1, connects signal 319(b) to the receive input of MIMO transceiver 328(b) labeled Rx 1, connects signal 319(c) to the receive input of MIMO

transceiver 328(c) labeled Rx 1, and so on for signals 319(d)-(f) and transceivers 328(d)-(f). Bus R2 connects 320(a)-(f) to transceivers 328(a)-(f) in the same fashion. Bus R2 connects signal 320(a) to the receive input of MIMO transceiver 328(a) labeled Rx 2, connects signal 320(b) to the receive input of MIMO transceiver 328(b) labeled Rx 2, connects signal 320(c) to the receive input of MIMO transceiver 328(c) labeled Rx 2, and so on for signals 320(d)-(f) and transceivers 328(d)-(f). Bus R3 connects signals 321(a)-(f) to transceivers 328(a)-(f) in the same fashion.

[0039] Also on the other side of the T/R switch 310 are three groups of six inputs (transmit signals), each group of six connected to a switch 314(a), 314(b) or 314(c), each group corresponding the six beams or one of the antenna arrays 210, 220 or 230. Each one of the six beams of each antenna array corresponds to one possible transmit signal.

[0040] Each switch connects one of the six outputs (corresponding to the six beams of each antenna array) to the output of a single power amplifier. The three power amplifiers with filters 318(a), 318(b) and 318(c) provide the transmit RF signal for each of the three antenna arrays. Any combination of the three power amplifiers (including none) can be used and any one time. The input of each power amplifier with filter is connected to another switch, a 6:1 transmit multiplexer (MUX). Transmit multiplexer (Tx MUX) 322(a) selects one of the six signals from transmit bus T1 (324(a)) to connect to power amplifier with filter 318(a). Similarly, Tx MUX 322(b) selects one of six signals from bus T2 (324(b)) to connect to power amplifier 318(b), and Tx MUX 322(c) selects one of six signals from bus T3 (324(c)) to connect to power amplifier 318(c). The combination of transmit multiplexer (e.g. 322(a)), power amplifier with filter (e.g. 318(a)) and switch (e.g. 314(a)), selects one of six inputs from a transmit bus (e.g. T1 324(a)) to connect, amplify, filter, and connect via switch (e.g. 314(a)) through T/R switches 310 to one of the six beams (e.g. 224(a)) of one antenna array (e.g. 220).

[0041] Six MIMO transceivers 328(a)-(f) each connect three receive inputs, one to each of receive busses R1 (326(a)), R2 (326(b)), and R3 (326(c)) and each connect three transmit outputs, one to each of transmit busses T1 (324(a)), T2 (324(b)), and T3 (326(c)). By doing this, one beam of each antenna array (210, 220 and 230) can be connected through T/R switch 310, receive processor 316, to the receive section of one MIMO transceiver (e.g. 250(a)). Similarly, the three transmit outputs of a single MIMO transceiver can be connected through Tx MUXs 322(a)-(c), power amplifiers and filters 318(a)-(c), switches 314(a)-(c) and T/R switch 310 to one beam of each antenna array 210, 220 and 230. The three transmit signals from 314(a), 314(b), and 314(c) may be connected to any three of the 18 transmit signals from MIMO transceivers 328(a)-(f). In this implementation, only one of the six signals on T1 only one of the six Tx 1 outputs of transceivers 250(a)-(f)) is amplified, filtered and provided to one of the six beams of antenna array 210. In addition, one of the six signals of T2 and one of the signals of T3 is also provided to antenna arrays 220 and 230, respectively.

[0042] Each MIMO transceiver interfaces to a central processing unit (CPU) 334 via PCI/PCI-e interface 332. Data received by each MIMO transceiver and data to be sent by each MIMO transceiver is passed over the PCI/PCI-e interface 332. PCI/PCI-e is an example interface and other interfaces (or bridges to other interfaces) could be used such as Ethernet, ATM, USB and any other wired or wireless interface. CPU 334 connects to a backhaul network 338 via an Ethernet 336 or other interface.

[0043] Each MIMO transceiver may perform built-in test functions periodically or as commanded by the CPU to assess if each transceiver is performing properly. CPU 334 may also pass commands to each transceiver. The commands may be passed over the radio status interface, PCI/PCI-e interface or other interface. The radio status interface for each radio is

managed by programmable logic 340 and CPU 334. Programmable logic 340 controls switch actuator 342 to select TX MUXs 322(a)-(c), switches 314(a)-(c) and TR Switch 310 position (Tx or Rx). Programmable logic 340 may also use radio card status information to determine the actual positions of TX MUXs 322(a)-(c), switches 314(a)-(c) and TR Switch 310. This provides closed loop feedback that switching commands have been properly executed. It also is used to prevent a Radio Card from attempting a transmission when another is transmitting, or a Radio Card from attempting a transmission when the T/R switch is set to receive

[0044] For example, programmable logic 340 and/or CPU 334 may determine that a radio card(s) different from the current radio card(s) should be enabled for transmission. Programmable logic 340 and/or CPU 334 may determine which radio card(s) should be used and which should be idled and may also coordinate the delivery of idle signals. Managing multiple radio cards is disclosed in U.S. Patent Application No. 10/700,342 "Signal Communication Coordination" and is herein incorporated by reference in its entirety.

[0045] Some operations required for determining which radio card(s) should be enabled and which should be idled may be performed in programmable logic 340 and some operations may be performed in CPU 334. Operations that require low latency or rapid processing are generally performed in programmable logic 340 while less time-critical operations may be performed in CPU 334. In some instances, to take advantage of regulatory constraints, a single transmitter may be desirable. In other instances, more than one transmitter may be used at a time.

[0046] FIG. 4 depicts another example of a block diagram for a time-division duplexing transceiver for extended communications range and throughput using MIMO and beamforming. The transceiver 400 has many of the same features as the transceiver 300.

Transceiver 400 adds the capability to transmit on all six beams of each of the three antenna arrays 210, 220 and 230, for a total of 18 simultaneous transmit beams instead of the three beams of transceiver 300. If transceiver 300 and transceiver 400 are the same except transceiver 400 supports 18 simultaneous transmit beams and transceiver 300 supports 3 simultaneous transmit beams with the total transmit power of 300 equal to the total transmit power of 400, transceiver 400 has a higher throughput than transceiver 300 although at a maximum range that is less than 300. Transceiver 400 may be attractive for operation within licensed spectrum, such as the spectrum of the 3GPP LTE-TDD standard.

[0047] Transceiver 400 supports three sets of six transmit processing paths 402(a)-(c) for a total of 18 simultaneous transmit processing paths. Each group of six processing paths 402(a)-(c) corresponds to signals destined for one of the antenna arrays 210, 220 and 230. Each of the 18 processing paths includes at least a power amplifier and a filter. In some implementations of the antenna array, an operator may choose to not simultaneously transmit two different signals on adjacent beams of an antenna array due to spatial overlap of the beams. Spatial overlap results in signal cross-talk or interference between the two beams which degrades performance of one or both beams.

[0048] FIG. 5 depicts an example of a block diagram for a frequency-division duplexing transceiver for extended communications range and throughput using MIMO and beamforming. The transceiver 500 has many of the same features as the transceiver 400 and transceiver 300. Instead of supporting time division duplexing as do transceivers 300 and 400, transceiver 500 supports frequency-division duplexing. Transceiver 500 also supports the capability to transmit on all six beams of each of the three antenna arrays 210, 220 and 230, for a

total of 18 simultaneous transmit beams as does transceiver 400. Transceiver 500 may be attractive for use in implementing the 3GPP LTE-FDD standard.

[0049] Transceiver 500 shows a system that uses frequency division duplexing (FDD). In a FDD system, transmit signals and receive signals occupy different frequencies. To separate transmit signals from receive signals transceiver 500 has a frequency selective duplexer 502 (also known as a diplexer) instead of the T/R switches of transceivers 300 and 400. Recall, a T/R switch separates transmit signals from receive signals by allowing only the transmit signal or the receive signal to pass through the switch at any given time. Transmit signals are separated from receive signals by time resulting in time-division duplexing (TDD). Like the T/R switches of TDD systems, diplexer 502 in a FDD system separates transmit signals from receive signals.

[0050] Aspects of the subject matter described herein may be embodied in systems, apparatus, methods, and/or articles depending on the desired configuration. For example, the transceivers (or one or more components therein) and/or the processes described herein can be implemented using one or more of the following: a processor executing program code, an application-specific integrated circuit (ASIC), a digital signal processor (DSP), an embedded processor, a field programmable gate array (FPGA), and/or combinations thereof. These various implementations may include implementation in one or more computer programs that are executable and/or interpretable on a programmable system including at least one programmable processor, which may be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least one input device, and at least one output device. These computer programs (also known as programs, software, software applications, applications, components, program code, or code) include machine instructions for a programmable processor, and may be implemented in a high-level procedural and/or object-

oriented programming language, and/or in assembly/machine language. As used herein, the phrase “machine-readable medium” refers to any computer program product, computer-readable medium, apparatus and/or device (e.g., magnetic discs, optical disks, memory, Programmable Logic Devices (PLDs)) used to provide machine instructions and/or data to a programmable processor, including a machine-readable medium that receives machine instructions. Similarly, systems are also described herein that may include a processor and a memory coupled to the processor. The memory may include one or more programs that cause the processor to perform one or more of the operations described herein.

[0051] Although a few variations have been described in detail above, other modifications or additions are possible. In particular, further features and/or variations may be provided in addition to those set forth herein. For example, the implementations described above may be directed to various combinations and subcombinations of the disclosed features and/or combinations and subcombinations of several further features disclosed above. In addition, the logic flow depicted in the accompanying figures and/or described herein does not require the particular order shown, or sequential order, to achieve desirable results. In various example implementations, the methods (or processes) can be accomplished on mobile station/mobile device side or on the server side or in any shared way between server and user equipment/mobile device with actions being performed on both sides. The phrases “based on” and “based on at least” are used interchangeably herein. Other implementations may be within the scope of the following claims.

WHAT IS CLAIMED:

1. A system comprising:
a plurality of m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:
a plurality of antenna elements; and
a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
a plurality of n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:
a MIMO receiver configured to accept m received signals, wherein the i-th input signal to the j-th MIMO receiver corresponds to the j-th beam of the i-th antenna array; and
a MIMO transmitter configured to provide m transmit signals, wherein the v-th output signal from the z-th MIMO transmitter corresponding to the z-th beam of the v-th antenna array is selected for transmission,
wherein m, n, v, and z are integer number values, and
wherein $i=1, \dots, m, j=1, \dots, n, \text{ and } v=1, \dots, m$.
2. The system of claim 1, wherein $z = [\text{one value between } 1 \text{ and } n]$.
3. The system of claim 1, wherein $z = 1, \dots, n$.
4. The system of claim 1, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n /ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.
5. The system of claim 1, wherein $m=3$ and $n=6$.

6. The system of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

7. The system of claim 1, wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency.

8. The system of claim 1, wherein the beamformer is an electronic beamformer.

9. The system of claim 1, wherein the antenna array further comprises a lens.

10. The system of claim 9, wherein the lens is a Honda or Rotman lens.

11. The system of claim 1, wherein the system simultaneously provides MIMO and beamforming

12. An apparatus comprising:

a plurality of m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

a plurality of n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array; and

a MIMO transmitter configured to provide m transmit signals,

wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission,

wherein m , n , v , and z are integer number values, and

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$.

13. The apparatus of claim 12, wherein $z = [\text{one value between } 1 \text{ and } n]$.
14. The apparatus of claim 12, wherein $z = 1, \dots, n$.
15. The apparatus of claim 12, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.
16. The apparatus of claim 12, wherein $m=3$ and $n=6$.
17. The apparatus of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.
18. The apparatus of claim 12, wherein the antenna elements are less than one half wavelength apart at the carrier frequency.
19. The apparatus of claim 12, wherein the beamformer is an electronic beamformer.
20. The apparatus of claim 12, wherein the antenna array further comprises a lens.
21. The apparatus of claim 12, wherein the lens is a Honda or Rotman lens.
22. The apparatus of claim 12, wherein the system simultaneously provides MIMO and beamforming
23. An apparatus comprising:
 - a plurality of m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and
 - a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

a plurality of n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array,

wherein m and n are integer number values, and

wherein $i=1, \dots, m$, and $j=1, \dots, n$.

24. An apparatus comprising:

a plurality of m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

a plurality of n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission,

wherein m , n , v , and z are integer number values, and

wherein $j=1, \dots, n$, and $v=1, \dots, m$.

ABSTRACT

A system is disclosed that includes a plurality of m antenna arrays configured to receive a propagating radio frequency signal. Each antenna array includes a plurality of antenna elements and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements. The system includes a plurality of n multiple-input multiple-output transceivers (MIMO). Each MIMO transceiver includes a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array. Each MIMO transceiver also includes a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission. m , n , v , and z are integer number values, and $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$.

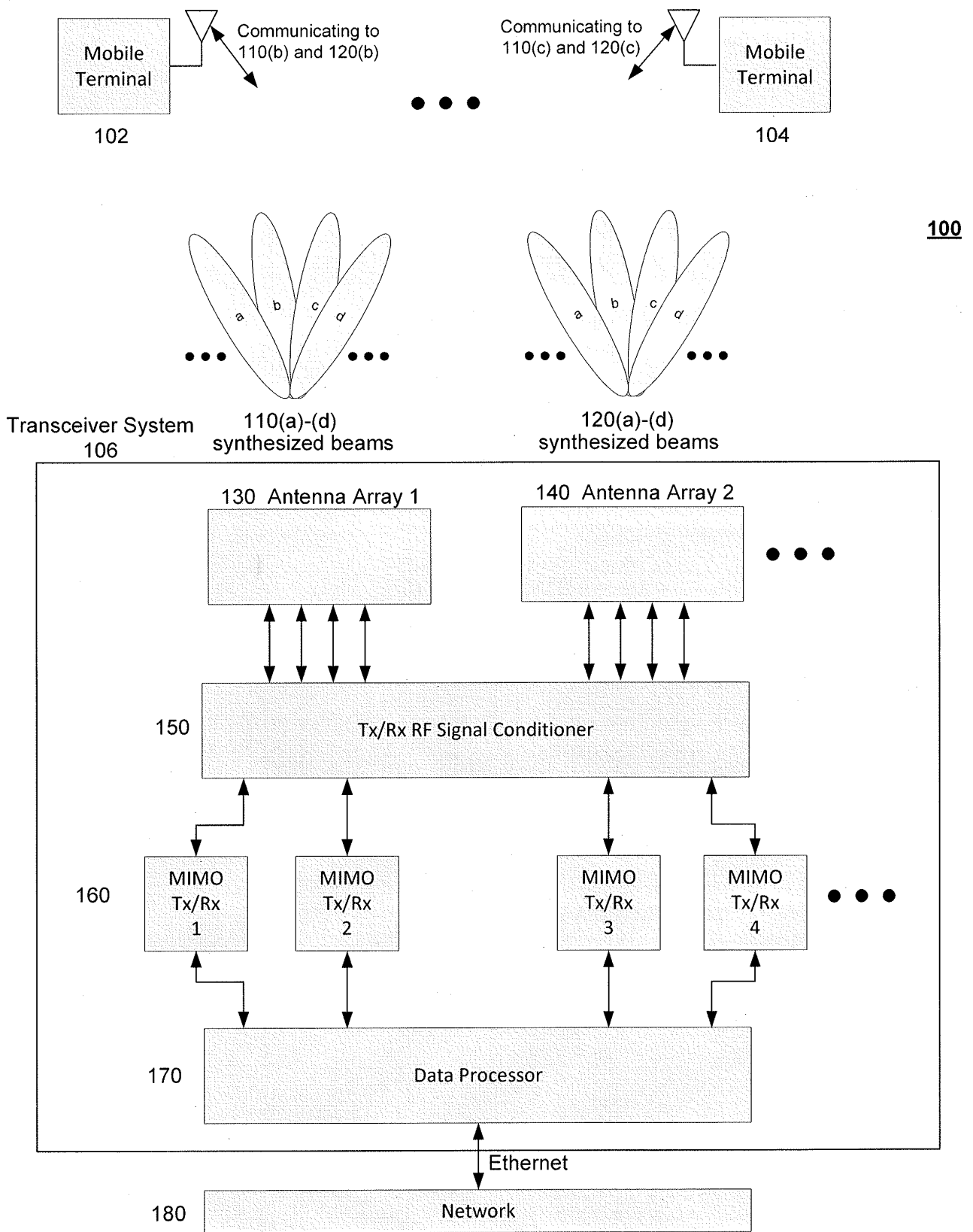


FIG. 1

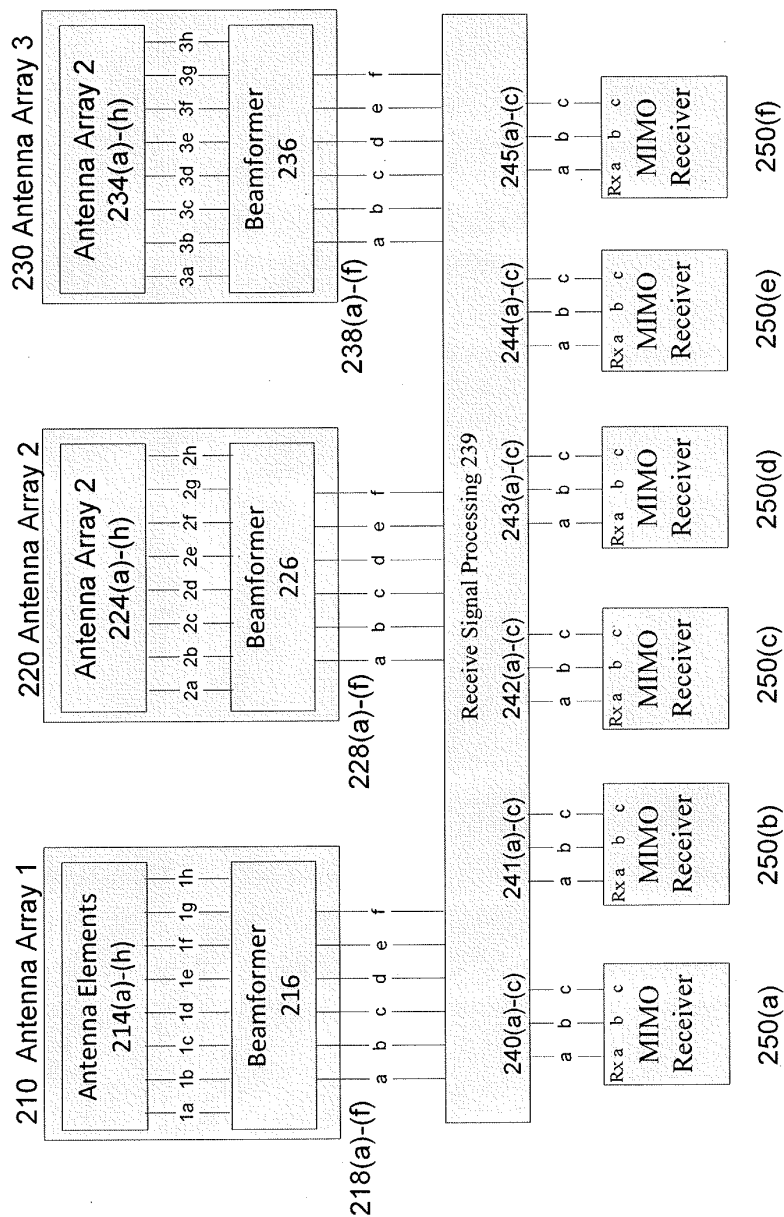
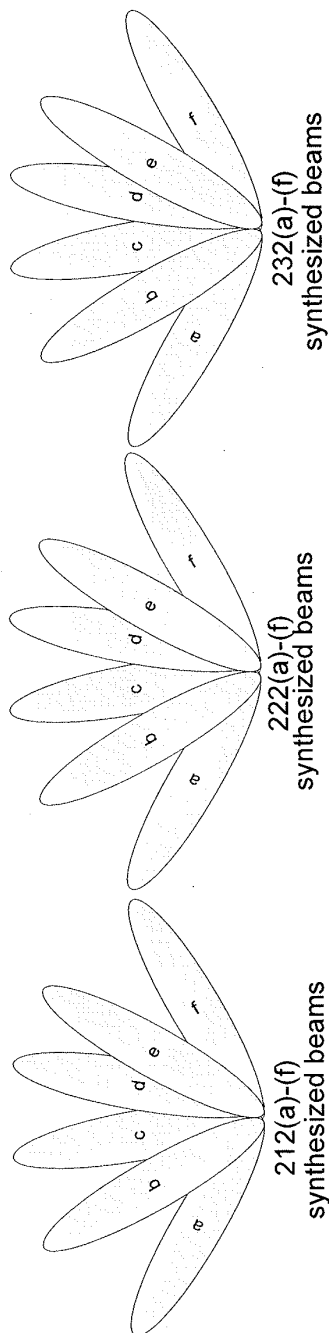


FIG. 2

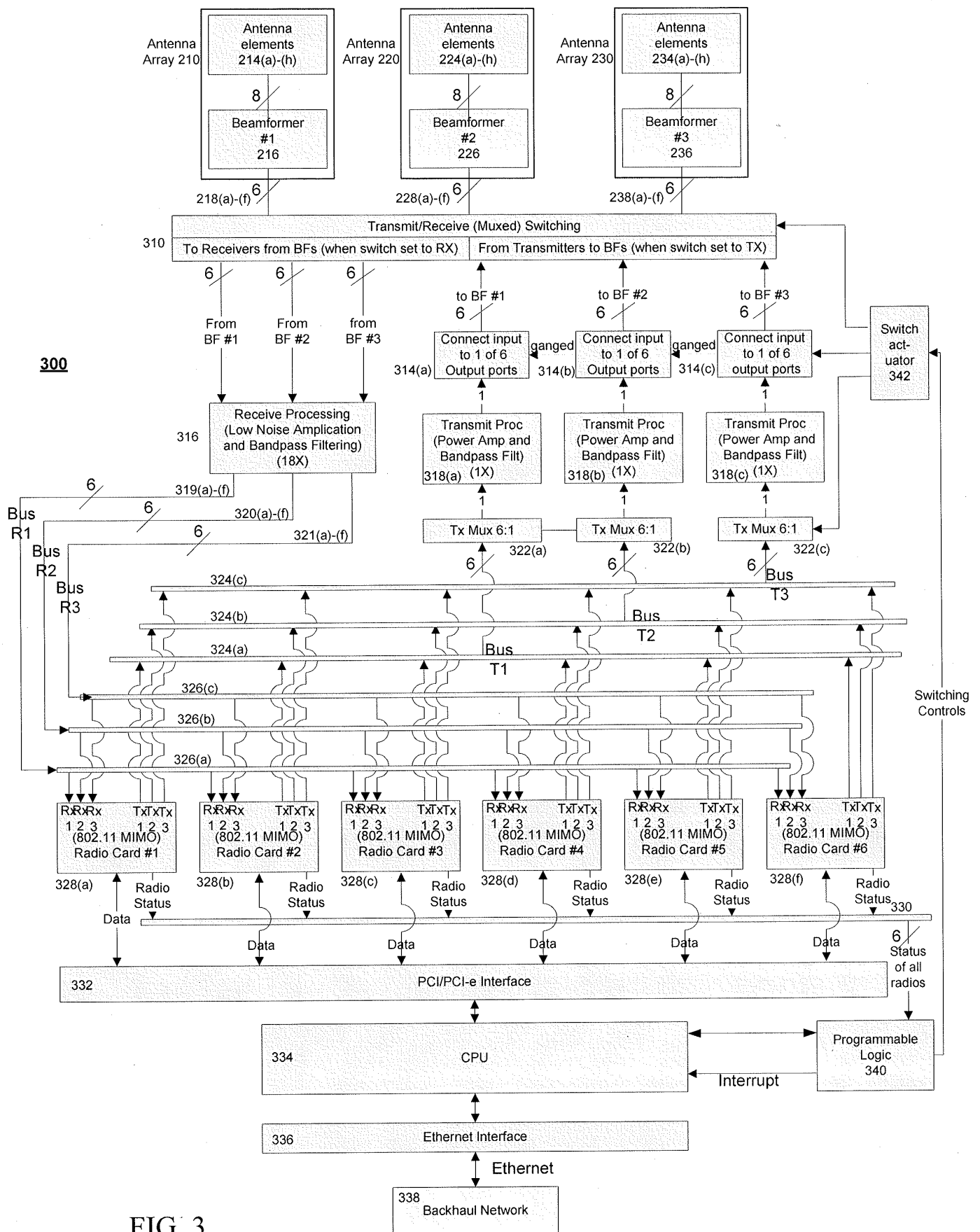


FIG. 3

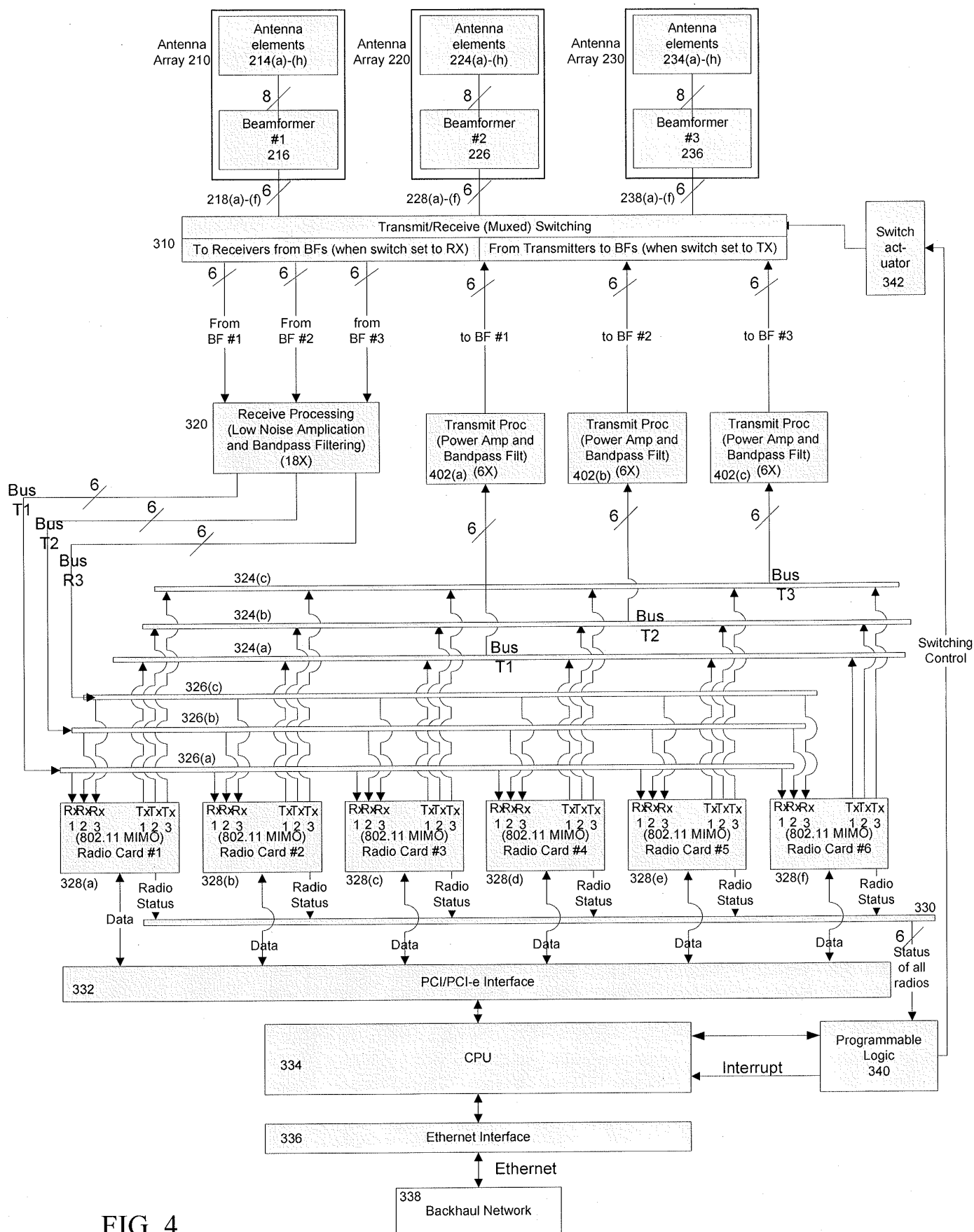


FIG. 4

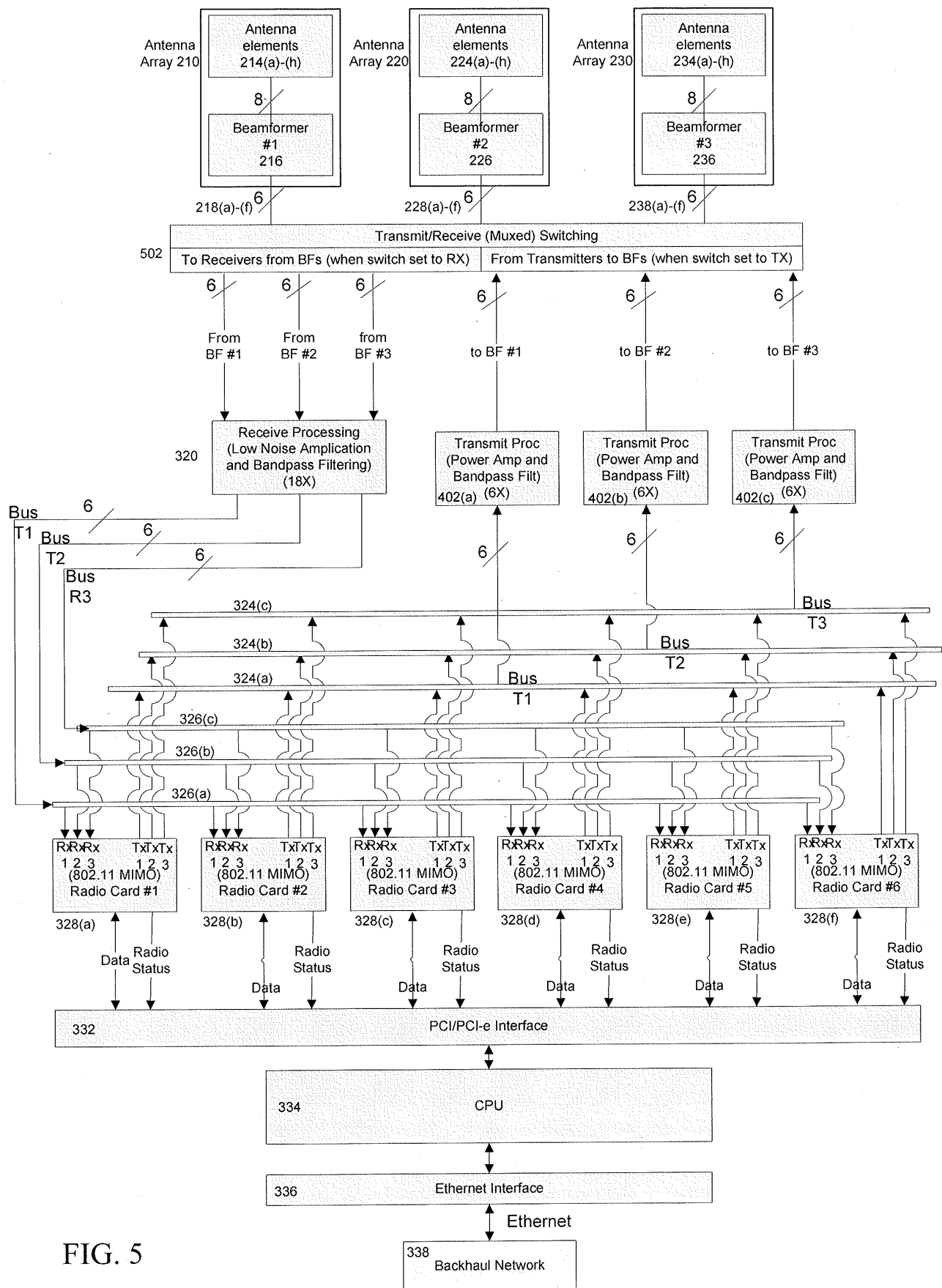


FIG. 5

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below-named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed and for which a patent is sought on the invention entitled:

DIRECTED MIMO COMMUNICATIONS

the specification of which:

☒ is attached hereto.

☐ was filed on _____.

☐ under Application No. _____

☒ under Attorney Docket Number 43273-513F01US

☐ with Express Mail No. _____ (Application Number not yet known).

☐ was described and claimed in PCT International Application No. _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim the benefit under Title 35, United States Code, §119(e)(1) of any United States provisional application(s) listed below:

U.S. Serial No.	Filing Date	Status
_____	_____	_____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Serial No.	Filing Date	Status
_____	_____	_____

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

Country	Application No.	Filing Date	Priority Claimed
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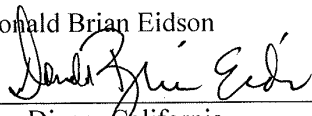
I hereby appoint all registered practitioners associated with **Customer Number 64046** to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to:

Customer Number 64046

Direct all telephone calls to Carl A. Kukkonen, Reg. No. 42,773 at telephone number (858) 314-1535.

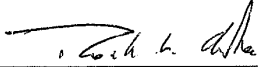
For Assigned Inventions: I understand that the purpose of making this appointment is to permit prosecution of patent applications for the above-identified invention for the benefit of my assignee, and that this appointment does not create an attorney-client relationship between me and these appointees.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Inventor: Donald Brian Eidson
Inventor's Signature:  Date: 4/13/2012
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Mailing Address: 444 S. Cedros Ave. Solana Beach, California 92075

Full Name of Inventor: Ronald William Chaffee

Inventor's Signature:



Date

2/13/12

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6350492v.1

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	43273-513F01US
		Application Number	
Title of Invention	Directed MIMO Communications		
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.)

Applicant Information:

Applicant 1					
Applicant Authority ☒ Inventor		☐ Legal Representative under 35 U.S.C. 117		☐ Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
Mr.	D.	Brian	Eidson		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	San Diego	State/Province	CA	Country of Residence	US
Citizenship under 37 CFR 1.41(b)		US			
Mailing Address of Applicant:					
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Address 2					
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Postal Code	92075		Country	US	
Applicant 2					
Applicant Authority ☒ Inventor		☐ Legal Representative under 35 U.S.C. 117		☐ Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
Mr.	Ronald	William	Chaffee		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	San Diego	State/Province	CA	Country of Residence	US
Citizenship under 37 CFR 1.41(b)		US			
Mailing Address of Applicant:					
Address 1		444 S. Cedros Ave.			
Address 2					
City	Solana Beach		State/Province	CA	
Postal Code	92075		Country	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add					

Correspondence Information:

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

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

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	43273-513F01US	
		Application Number		
Title of Invention	Directed MIMO Communications			
Customer Number	64046			
Email Address	cakukkonen@mintz.com		Add Email	Remove Email

Application Information:

Title of the Invention	Directed MIMO Communications Systems		
Attorney Docket Number	43273-513F01US	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)	N/A		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

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). Enter either 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	64046		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	43273-513F01US
		Application Number	
Title of Invention	Directed MIMO Communications		

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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(a).

Remove			
Application Number	Country ⁱ	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			☐ Yes ☐ No
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Assignee Information:

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

Assignee 1

If the Assignee is an Organization check here. ☒

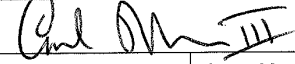
Organization Name XR Communications, LLC

Mailing Address Information:

Address 1	444 S. Cedros Ave.		
Address 2			
City	Solana Beach	State/Province	CA
Country ⁱ	US	Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Assignee Data may be generated within this form by selecting the Add button.			

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature			Date (YYYY-MM-DD)	2012-04-13
First Name	Carl	Last Name	Kukkonen	Registration Number
				42773

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.**

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		DIRECTED MIMO COMMUNICATIONS		
First Named Inventor/Applicant Name:		D. Brian Eidson		
Filer:		Carl A. Kukkonen/Kethya Teuk		
Attorney Docket Number:		43273-513F01US		
Filed as Small Entity				
Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	95	95
Utility Search Fee	2111	1	310	310
Utility Examination Fee	2311	1	125	125
Request for Prioritized Examination	2817	1	2400	2400
Pages:				
Claims:				
Claims in excess of 20	2202	4	30	120
Independent claims in excess of 3	2201	1	125	125

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous-Filing:				
Publ. Fee- early, voluntary, or normal	1504	1	300	300
Processing Fee, except for Provis. apps	1808	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				3605

Electronic Acknowledgement Receipt	
EFS ID:	12543525
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	D. Brian Eidson
Customer Number:	64046
Filer:	Carl A. Kukkonen/Kethya Teuk
Filer Authorized By:	Carl A. Kukkonen
Attorney Docket Number:	43273-513F01US
Receipt Date:	13-APR-2012
Filing Date:	
Time Stamp:	22:25:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 3605
RAM confirmation Number	7100
Deposit Account	500311
Authorized User	KUKKONEN,CARL
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Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	Track1.pdf	78123	no	1
			c5f22ee37e2a17749d0bd97e0dc42bb5d796b2e0		
Warnings:					
Information:					
2	Transmittal of New Application	Tra.pdf	73131	no	1
			5a24d0f49e4892c96b8b41d6e3c8fb031aef1425		
Warnings:					
Information:					
3		Spec.pdf	1118124	yes	23
			0e82edd1f14dcc1ad31cbb23f85f2a0768d0eaf9		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	18	
	Claims		19	22	
	Abstract		23	23	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	Figs.pdf	470173	no	5
			74340056e4ffbcdd08474c596bfa6900d8505fb5		
Warnings:					
Information:					
5	Oath or Declaration filed	Dec.pdf	111733	no	3
			61c3613ce28dc520b9d76b4a29972bb1740986ff		
Warnings:					
Information:					
6	Application Data Sheet	ADS.pdf	229982	no	3
			5f0e5fd950c0905940d913835043d71d63ec4318		
Warnings:					
Information:					

This is not an USPTO supplied ADS fillable form

7	Fee Worksheet (SB06)	fee-info.pdf	42942	no	2
			bd6c8ed67f4648894b45e4628def5e006e1763c8		

Warnings:

Information:

Total Files Size (in bytes):	2124208
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/447,139				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	95		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	310		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	24	minus 20 = *	4	x 30 =	120					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4	minus 3 = *	1	x 125 =	125					
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	775		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		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	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
13/447,139	04/13/2012	2611	1075	43273-513F01US	24	4

CONFIRMATION NO. 4764

64046
MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C
ONE FINANCIAL CENTER
BOSTON, MA 02111

FILING RECEIPT



OC000000053940373

Date Mailed: 04/27/2012

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

Applicant(s)

Donald Brian Eidson, San Diego, CA;
Ronald William Chaffee, San Diego, CA;

Assignment For Published Patent Application

XR Communications, LLC, Solana Beach, CA

Power of Attorney: The patent practitioners associated with Customer Number 64046

Domestic Priority data as claimed by applicant

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 04/25/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/447,139**

Projected Publication Date: Perfected

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

DIRECTED MIMO COMMUNICATIONS SYSTEMS

Preliminary Class

375

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.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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

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

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/447,139				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	95		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	310		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	24	minus 20 = *	4	x 30 =	120					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4	minus 3 = *	1	x 125 =	125					
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	775		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		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	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE				TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
13/447,139	04/13/2012	2611	1075	43273-513F01US	24	4

CONFIRMATION NO. 4764

64046
MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C
ONE FINANCIAL CENTER
BOSTON, MA 02111

FILING RECEIPT



OC000000053940373

Date Mailed: 05/03/2012

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Applicant(s)

Donald Brian Eidson, San Diego, CA;
Ronald William Chaffee, San Diego, CA;

Assignment For Published Patent Application

XR Communications, LLC, Solana Beach, CA

Power of Attorney: The patent practitioners associated with Customer Number 64046

Domestic Priority data as claimed by applicant

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 04/25/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/447,139**

Projected Publication Date: 10/17/2013

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

DIRECTED MIMO COMMUNICATIONS SYSTEMS

Preliminary Class

375

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

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

NOT GRANTED

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ONE FINANCIAL CENTER
BOSTON MA 02111

MAILED
MAY 30 2012
OFFICE OF PETITIONS

Doc Code: TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 13/447,139
1. THE REQUEST FILED <u>April 13, 2012</u> IS GRANTED. The above-identified application has met the requirements for prioritized examination A. ☒ for an original nonprovisional application (Track I). B. ☐ for an application undergoing continued examination (RCE). 2. The above-identified application will undergo prioritized examination. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs: A. filing a <u>petition for extension of time</u> to extend the time period for filing a reply; B. filing an <u>amendment to amend the application to contain more than four independent claims, more than thirty total claims,</u> or a multiple dependent claim; C. filing a <u>request for continued examination</u>; D. filing a notice of appeal; E. filing a request for suspension of action; F. mailing of a notice of allowance; G. mailing of a final Office action; H. completion of examination as defined in 37 CFR 41.102; or I. abandonment of the application. Telephone inquiries with regard to this decision should be directed to <u>Michelle R. Eason</u> at (571) 272-4231. In his/her absence, calls may be directed to Brian W. Brown at (571) 272-5338. <u>/Brian W. Brown/</u> (Signature) <u>Petitions Examiner, Office of Petitions</u> (Title)	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 13/447,139 Conf. No.: 4764
Applicant: D. Brian Eidson TC/Art Unit: 2611
Filed: April 13, 2012 Examiner: Not Yet Assigned
For: DIRECTED MIMO COMMUNICATIONS

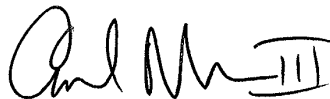
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CORRECTED FILING RECEIPT

The undersigned respectfully requests a Corrected Filing Receipt for the above-referenced application. Enclosed is a copy of a Supplemental Application Data Sheet and a copy of the Filing Receipt dated May 3, 2012 with the correction noted thereon (Title should be **DIRECTED MIMO COMMUNICATIONS**). Issuance of a corrected filing receipt is respectfully requested.

It is believed that no fee is due. However, the Commissioner is authorized to charge any additional fees or credit overpayments to Deposit Account No. 50-0311, Reference Number 43273-513F01US.

Respectfully submitted,



Carl A. Kukkonen, III
Reg. No. 42,773

Date: 5/31/12

PTO Customer No. 64046

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
3580 Carmel Mountain Road, Suite 300
San Diego, CA 92130
Telephone: (858) 314-1535
Fax: (858) 314-1501
Email: cakukkonen@mintz.com

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 5/31/12 Signature: 
(Chelsea C. Pearsall)

Supplemental Application Data Sheet

Application Information

Application number::	13/447,139
Filing Date::	04/13/12
Application Type::	Regular
Subject Matter::	Utility
Suggested Group Art Unit::	2611
CD-ROM or CD-R?::	None
Sequence submission?::	None
Computer Readable Form (CRF)?::	No
Title::	Directed MIMO Communications
Attorney Docket Number::	43273-513F01US
Request for Early Publication?::	No
Request for Non-Publication?::	No
Small Entity?::	Yes
Petition included?::	No
Secrecy Order in Parent Appl.?::	No

Applicant Information

Applicant Authority Type::	Inventor
Primary Citizenship Country::	US
Status::	Full Capacity
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Country of Residence:: US
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City of mailing address:: Solana Beach
State or Province of mailing address:: CA
Postal or Zip Code of mailing address:: 92075

Applicant Authority Type:: Inventor
Primary Citizenship Country:: US
Status:: Full Capacity
Given Name:: Ronald
Middle Name:: William
Family Name:: Chaffee
City of Residence:: San Diego
State or Province of Residence:: CA
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Street of mailing address:: 444 S. Cedros Ave.
City of mailing address:: Solana Beach
State or Province of mailing address:: CA
Postal or Zip Code of mailing address:: 92075

Correspondence Information

Correspondence Customer Number:: 64046

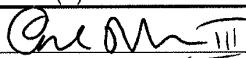
Representative Information

Representative Customer Number:: 64046

Domestic Priority Information**Foreign Priority Information****Assignee Information**

XR Communications, LLC
444 S. Cedros Ave
Solana Beach, California 92075

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.			
Signature		Date	5-31-12
Name (Print/Type)	Carl A. Kukkonen, III	Registration No. (Attorney/Agent)	42,773



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	TOT CLAIMS	IND CLAIMS
13/447,139	04/13/2012	2611	1075	43273-513F01US	24	4

CONFIRMATION NO. 4764

FILING RECEIPT



64046
MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C
ONE FINANCIAL CENTER
BOSTON, MA 02111

Date Mailed: 05/03/2012

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Applicant(s)

Donald Brian Eidson, San Diego, CA;
Ronald William Chaffee, San Diego, CA;

Assignment For Published Patent Application

XR Communications, LLC, Solana Beach, CA

Power of Attorney: The patent practitioners associated with Customer Number 64046

Domestic Priority data as claimed by applicant

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If Required, Foreign Filing License Granted: 04/25/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/447,139**

Projected Publication Date: 10/17/2013

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

DIRECTED MIMO COMMUNICATIONS ~~SYSTEMS~~

Preliminary Class

375

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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.

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LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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Electronic Acknowledgement Receipt	
EFS ID:	12906429
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS SYSTEMS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	Carl A. Kukkonen/Chelsea Pearsall
Filer Authorized By:	Carl A. Kukkonen
Attorney Docket Number:	43273-513F01US
Receipt Date:	31-MAY-2012
Filing Date:	13-APR-2012
Time Stamp:	17:16:47
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	Request for Corrected Filing Receipt	RequestCorrectFilingReceipt.pdf	44843 908ac88bc15d0063125e334e66c078aa1b436327	no	1

Warnings:

Information:

2	Application Data Sheet	SupplementalADS.pdf	63561 dae80492061af5c60be42905144bf441a474ae1c	no	3
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Miscellaneous Incoming Letter	FilingReceipt.pdf	184186 6f1194e36e35c00e95cbf26c4a993fb928ef578a	no	3
Warnings:					
Information:					
Total Files Size (in bytes):			292590		
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.					



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/447,139	04/13/2012	2611	1075	43273-513F01US	24	4

CONFIRMATION NO. 4764

CORRECTED FILING RECEIPT



OC000000054596427

64046
MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C
ONE FINANCIAL CENTER
BOSTON, MA 02111

Date Mailed: 06/07/2012

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Applicant(s)

Donald Brian Eidson, San Diego, CA;
Ronald William Chaffee, San Diego, CA;

Assignment For Published Patent Application

XR Communications, LLC, Solana Beach, CA

Power of Attorney: The patent practitioners associated with Customer Number 64046

Domestic Priority data as claimed by applicant

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 04/25/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/447,139**

Projected Publication Date: 10/17/2013

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

DIRECTED MIMO COMMUNICATIONS

Preliminary Class

375

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PLUS Search Results for S/N 13447139, Searched Mon Jun 25 14:44:48 EDT 2012
The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764
64046 7590 06/29/2012 MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C ONE FINANCIAL CENTER BOSTON, MA 02111			EXAMINER CADEAU, WEDNEL	
			ART UNIT 2611	PAPER NUMBER
			MAIL DATE 06/29/2012	DELIVERY MODE 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.

DETAILED ACTION

Prior arts used in this office action:

Adams et al. (US 20090322608 A1, hereinafter "Adams")

Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna")

Lou et al (20080240208 A1, hereinafter "Lou")

Honda (US 20050156801 A1, hereinafter "Honda")

Claim Objections

Applicant is advised that should claim **6** be found allowable, claim **17** will be objected to under **37 CFR 1.75** as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Applicant is advised that should claim **12** be found allowable, claims **23 and 24** will be objected to under **37 CFR 1.75** as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 12, 23, 24 recite in part "a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements" and "a plurality of n multiple-input

multiple-output transceivers (MIMO) comprising”. The variable n is attributed to two different elements which render the claims infinite. If variable is considered to be the same there is no antecedent basis or rational to support that in the claim.

Claim Rejections - 35 USC § 103

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

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

Claims 1-3, 5-8, 12-14, 16-19, 23, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 20090322608 A1, hereinafter "Adams") in view of Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna").

Regarding claims 1, 12, 23, 24:

Adams teaches a system comprising:

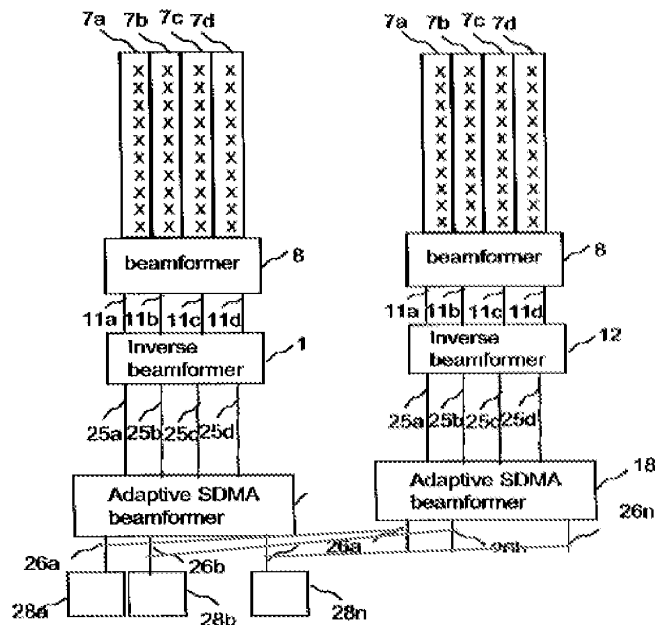
a plurality of m antennas arrays configured to receive a propagating radio frequency signal (*Adams [0004], figs. 3, 5, where Adams gives an overview of the system in relation to prior arts and that such systems usually composed of arrays of antenna elements*), each of the antenna arrays comprising:

a plurality of antenna elements (*Adams [0004], where Adams discloses arrays that are composed of a plurality of antenna elements*); and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements (*Adams [0070]*, where *Adams* discloses a beam former (8) that produce several bi-directional beams); and

a plurality of n multiple-input multiple-output transceivers (MIMO) comprising (*Adams [0004]*, [0040]-[0041], [0050], [0057], *figs. 3, 5-8, 16, and 17*, where *Adams* discloses a several MIMO transceivers), each MIMO transceiver;

a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array (*Adams [0008]*, [0060], [0061], *figs. 5, 8, 14, 15, 17*, although *Adams* only shows one antenna array, he discloses that the signals received at individual antenna element (7a) are connected to a respective individual element output of the inverse beamformer 25a, therefore it would have been obvious to one with ordinary skill in the art to recognize that if more than one arrays were illustrated all the elements (7a) from each array would end up combined together to form (25a) and so on.. and associate (25a) to a particular MIMO transceiver like in *figs. 8 and 17*);



and

a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission, wherein m , n , v , and z are integer number values, and wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$ (Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, since Adams system is a transceiver it is safe to say that the same principle would apply on the reverse link).

Although implicitly one can see that the system of Adams performs both transmission and reception via antennal elements 7a-7d, however, in order to be more explicit one can rely on the teaching of Rudrapatna. Rudrapatna discloses a plurality of arrays of antenna elements in a beamforming MIMO where antenna elements and/or arrays of antennas are selected to perform transmission or reception as necessary (Rudrapatna [0017]-[0019], figs 1 and 2).

Therefore, taking the teaching of Adams and Rudrapatna as a whole it would have been obvious to one with ordinary skill in the art to arrive at the claimed invention such that

transmission and reception form a particular user can be determined and process accordingly in a full duplex communication system.

Regarding claims 2 and 13:

Adams in view of Rudrapatna teaches wherein $z = [\text{one value between 1 and } n]$ (Adams [0008], fig. 5).

Regarding claims 3 and 14:

Adams teaches wherein $z = 1, \dots, n$ (Adams [0008], figs. 5, 7).

Regarding claims 5 and 16:

Adams in view of Rudrapatna wherein $m=3$ and $n=6$ (Rudrapatna [0011], figs. 1 and 2, where Rudrapatna teaches that the system contains at least two antenna groups and each groups contains at least two pairs of antennas).

Regarding claims 6 and 17:

Adams teaches all the limitation of this claim except wherein the antenna arrays are separated by a distance more than one wavelength.

Rudrapatna teaches a beamforming MIMO system wherein the antenna groups are separated by more the one wavelength (Rudrapatna [0031]).

Therefore, taking the teaching of Adams and Rudrapatna as a whole, it would have been obvious to one with ordinary skill in the art at the time the invention was made to arrive at the claimed invention, in order to perform simultaneously beamforming and MIMO communication.

Regarding claims 7 and 18:

Adams teaches wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency (Adams [0073])..

Regarding claims 8 and 19:

Adams in view of Rudrapatna teaches wherein the beamformer is an electronic beamformer (*Adams [0008], fig. 4; Rudrapatna [0024]*).

Regarding claims 11 and 22:

Adams in view of Rudrapatna teaches wherein the system simultaneously provides MIMO and beam forming (Rudrapatna [0031]).

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 20090322608 A1, hereinafter "Adams") in view of Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna"), and in view of Lou et al (20080240208 A1, hereinafter "Lou").

Regarding claims 4 and 15:

Adams in view of Rudrapatna teaches all the limitation of this claim except wherein the system is configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11 a/b/g/n/ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3 GPP) Long Term Evolution (LTE), 3 GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

However Lou teaches and adaptive switching techniques for Hybrid automatic repeat request systems where MIMO beamforming in accordance with many standards including for instance, 3GPP LTE, 3GPP2, IEEE 802.11, WiMAX, and so on..

Therefore, taking the teaching of Adams, Rudrapatna, and Lou as a whole, it would have been obvious to one with ordinary skill in the art to arrive at the claimed invention, the reason being to develop a system that is compatible to many systems currently being used in the field,

thereby a system that would have a broad application since most systems are being built to conform the standards developed by the engineering body or bodies responsible to coordinate the technology advancements.

Claims 9-10, 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 20090322608 A1, hereinafter "Adams") in view of Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna"), and in view of Honda (US 20050156801 A1, hereinafter "Honda").

Regarding claims 9, 10, 20, 21:

Adams in view of Rudrapatna teaches all the limitation of this claim except wherein the lens is a Honda or Rotman lens.

Honda teaches and antenna array that comprise an electromagnetic lens (hence Honda lens) and also teaches that it is customary to use also Rotman lens in those type of systems (Honda [0008], [0035]-[0036], fig. 5).

Therefore, taking the teaching of Adams, Rudrapatna, and Honda as a whole, it would have been obvious to one with ordinary skill in the art at the time the invention was made to arrive at the claimed invention, since using Honda and/or Rotman lens in antenna array are well known in the art for their performance, such as to improve viability and versatility of wireless communication and beamforming options (Honda [0007]).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WEDNEL CADEAU whose telephone number is (571)270-7843. The examiner can normally be reached on M-TH 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WEDNEL CADEAU/
Examiner, Art Unit 2611
June 26, 2012

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611

Notice of References Cited	Application/Control No. 13/447,139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.	
	Examiner WEDNEL CADEAU	Art Unit 2611	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2009/0322608	12-2009	Adams et al.	342/368
*	B	US-2002/0132600	09-2002	Rudrapatna, Ashok N.	455/277.1
*	C	US-2008/0240208	10-2008	Lou et al.	375/211
*	D	US-2005/0156801	07-2005	Honda, Royden M.	343/754
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

<i>Search Notes</i> 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2611

SEARCHED			
Class	Subclass	Date	Examiner
375	267, 211, 146, 347	6/25/2012	WC
455	277.1, 63.4, 63.1	6/25/2012	WC

SEARCH NOTES		
Search Notes	Date	Examiner
Plus Search	6/25/2012	WC
Inventor Search	6/25/2012	WC
IEEE Search	6/25/2012	WC
Google Search	6/25/2012	WC
NPL Search	6/25/2012	WC

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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BIB DATA SHEET

CONFIRMATION NO. 4764

SERIAL NUMBER 13/447,139	FILING or 371(c) DATE 04/13/2012 RULE	CLASS 375	GROUP ART UNIT 2611	ATTORNEY DOCKET NO. 43273-513F01US
APPLICANTS Donald Brian Eidson, San Diego, CA; Ronald William Chaffee, San Diego, CA; ** CONTINUING DATA ***** ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED *** SMALL ENTITY ** 04/25/2012				
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and /WEDNEL CADEAU/ Acknowledged Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 5	TOTAL CLAIMS 24
INDEPENDENT CLAIMS 4				
ADDRESS MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C ONE FINANCIAL CENTER BOSTON, MA 02111 UNITED STATES				
TITLE DIRECTED MIMO COMMUNICATIONS				
FILING FEE RECEIVED 1075	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	0	"13447139"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:03
S2	486	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:10
S3	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S4	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S5	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj2 direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S6	1	"6980169"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:31
S7	4	("20040174299" "20040223476" "20040224637" "20050075070").PN. OR ("6980169").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 09:38
S8	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same arrays and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S9	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same "arrays" and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S10	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S11	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S12	0	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former) and (signal near condition\$4)	USPAT	OR	ON	2012/06/25 12:00
S13	13	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT	OR	ON	2012/06/25 12:02
S14	0	"20090103593"	USPAT	OR	ON	2012/06/25 12:29
S15	2	"20090103593"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 12:29

EAST Search History

S16	0	"10760023"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:00
S17	1	"20050156801"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:01
S18	0	"13447139"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 15:21
S19	48	(US-20060264184-\$ or US-20080304463-\$ or US-20080304464-\$ or US-20090203405-\$ or US-20100304666-\$ or US-20120046003-\$ or US-20060239366-\$ or US-20060239372-\$ or US-20060239373-\$ or US-20060239374-\$ or US-20060239375-\$ or US-20060291544-\$ or US-20070015543-\$ or US-20070210960-\$ or US-20070225033-\$ or US-20080285637-\$ or US-20080318524-\$ or US-20090046768-\$ or US-20090161739-\$ or US-20090325515-\$ or US-20100150254-\$ or US-20100171661-\$ or US-20100234071-\$ or US-20110199968-\$ or US-20110228749-\$ or US-20110280341-\$).did. or (US-20120112962-\$).did. or (US-7751494-\$ or US-7769098-\$ or US-7502408-\$ or US-7574236-\$ or US-7619997-\$ or US-7693551-\$ or US-7714780-\$ or US-7738583-\$ or US-7738584-\$ or US-7986650-\$ or US-8040970-\$ or US-8045926-\$ or US-8085871-\$ or US-8120532-\$ or US-8126040-\$ or US-8180285-\$ or US-8184679-\$ or US-7809074-\$ or US-7893871-\$ or US-7917176-\$ or US-7961807-\$).did.	US-PGPUB; USPAT	OR	ON	2012/06/25 15:23
S20	45	((DONALD) near2 (EIDSON)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:29
S21	3	((DONALD) near2 (EIDSON)).INV. and beam\$6	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:30
S22	0	((RONALD) near2 (CHAFFEE)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:32
S23	2989	(antenna adj arrays) with (spacing or distance or wavelength)	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:36
S24	84	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:37
S26	2	"20080240208"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/26 10:22

EAST Search History (Interference)

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S25	0	"13447139"	US-PGPUB; USPAT; UPAD	OR	ON	2012/06/25 15:22

6/ 26/ 2012 6:07:42 PM

C:\ Users\ wcadeau\ Documents\ EAST\ Workspaces\ 13447139.wsp

<i>Index of Claims</i> 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2611

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

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	06/26/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
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	22	✓								
	23	✓								
	24	✓								

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : D. Brian Eidson Art Unit : 2611
Serial No. : 13/447,139 Confirmation No.: 4764
Filed : April 13, 2012 Examiner : Wednel Cadeau
Title : DIRECTED MIMO COMMUNICATIONS

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

REPLY TO NON-FINAL OFFICE ACTION MAILED JUNE 29, 2012

This reply is responsive to the Non-Final Office Action mailed June 29, 2012. The undersigned respectfully requests reconsideration and allowance of the present application in view of the following amendments and remarks.

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

Remarks begin on page 7 of this paper.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being electronically transmitted to the Patent and Trademark Office on the date indicated below in accordance with 37 CFR 1.8(a)(1)(i)(C).

September 21, 2012
Date of Transmission

/mff/
Signature

Maria Fambro
Typed or Printed Name of Person Signing Certificate

Amendments to the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A system comprising:

~~a plurality of~~ m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

~~a plurality of~~ n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to accept m received signals, wherein the i-th input signal to the j-th MIMO receiver corresponds to the j-th beam of the i-th antenna array; and

a MIMO transmitter configured to provide m transmit signals, wherein the v-th output signal from the z-th MIMO transmitter corresponding to the z-th beam of the v-th antenna array is selected for transmission,

wherein m, n, v, and z are integer number values, ~~and~~

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

2. (Original) The system of claim 1, wherein $z = [\text{one value between } 1 \text{ and } n]$.

3. (Original) The system of claim 1, wherein $z = 1, \dots, n$.

4. (Original) The system of claim 1, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n /ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

5. (Original) The system of claim 1, wherein $m=3$ and $n=6$.

6. (Original) The system of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

7. (Original) The system of claim 1, wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency.

8. (Original) The system of claim 1, wherein the beamformer is an electronic beamformer.

9. (Original) The system of claim 1, wherein the antenna array further comprises a lens.

10. (Original) The system of claim 9, wherein the lens is a Honda or Rotman lens.

11. (Currently Amended) The system of claim 1, wherein the system simultaneously provides MIMO and beamforming.

12. (Currently Amended) An apparatus comprising:

~~a plurality of~~ m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

a plurality of ~~n~~ multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array; and

a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission,

wherein m , n , v , and z are integer number values, and

wherein $i=1, \dots, m, j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

13. (Original) The apparatus of claim 12, wherein $z = [\text{one value between } 1 \text{ and } n]$.

14. (Original) The apparatus of claim 12, wherein $z = 1, \dots, n$.

15. (Original) The apparatus of claim 12, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

16. (Original) The apparatus of claim 12, wherein $m=3$ and $n=6$.

17. (Currently Amended) The apparatus of claim ~~[[1]]~~ 12, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

18. (Original) The apparatus of claim 12, wherein the antenna elements are less than one half wavelength apart at the carrier frequency.

19. (Original) The apparatus of claim 12, wherein the beamformer is an electronic beamformer.

20. (Original) The apparatus of claim 12, wherein the antenna array further comprises a lens.

21. (Original) The apparatus of claim 12, wherein the lens is a Honda or Rotman lens.

22. (Currently Amended) The apparatus of claim 12, wherein the system simultaneously provides MIMO and beamforming.

23. (Currently Amended) An apparatus comprising:

~~a plurality of~~ m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different ~~bi-directional~~ receive beams using the plurality of antenna elements; and

~~a plurality of~~ n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to accept m received signals, wherein the i-th input signal to the j-th MIMO receiver corresponds to the j-th beam of the i-th antenna array,

wherein m and n are integer number values, and

wherein $i=1, \dots, m$, and $j=1, \dots, n$, and

wherein $n \geq 2$ and $m \geq 2$.

24. (Currently Amended) An apparatus comprising:

~~a plurality of~~ m antenna arrays configured to ~~receive~~ transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different ~~bi-directional~~ transmit beams using the plurality of antenna elements; and

a plurality of ~~n~~ multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to provide ~~m~~ transmit signals, wherein the ~~v~~-th output signal from the ~~z~~-th MIMO transmitter corresponding to the ~~z~~-th beam of the ~~v~~-th antenna array is selected for transmission,

wherein ~~m~~, ~~n~~, ~~v~~, and ~~z~~ are integer number values, and

wherein ~~j~~=1, ..., ~~n~~, and ~~v~~=1, ..., ~~m~~, and

wherein $n \geq 2$ and $m \geq 2$.

REMARKS

Reconsideration and allowance are requested in light of this reply. No new matter has been added. The examiner is encouraged to contact the undersigned at +1.858.314.1487 or dclaney@mintz.com to discuss how best to advance prosecution of this case in light of this reply.

Summary of Rejections

The Office objected to claim 17 under 37 C.F.R. 1.75 as being substantially duplicate to claim 6 and objected to claims 23 and 24 under 37 C.F.R. 1.75 as being substantially duplicate to claim 12; rejected claims 1-24 under 35 U.S.C. §112, second paragraph, as indefinite; rejected claims 1-3, 5-8, 12-14, 16-19, 23, and 24 under 35 U.S.C. §103(a) as unpatentable over U.S. Patent Application Publication No. 2009/0322608 to Adams et al. (hereinafter, Adams) in view of U.S. Patent Application Publication No. 2002/0132600 to Rudrapatna (hereinafter, Rudrapatna); and rejected claims 9-10, 20, and 21 under 35 U.S.C. §103(a) as unpatentable over Adams in view of Rudrapatna and U.S. Patent Application Publication No. 2005/0156801 to Honda (hereinafter, Honda). These rejections are all respectfully traversed.

Summary of Amendments

By this Amendment, claims 1, 11, 12, 17, and 22-24 are amended to more clearly define the features of those claims and improve form. Support for the amendments can be found at least at Figs. 1-5. No new matter has been added.

Claims 1-24 are pending.

Objections to the Claims

The Office objected to claim 17 under 37 C.F.R. 1.75 as being substantially duplicate to claim 6. The undersigned submits that the instant amendment to claim 17 obviates the basis for the rejection. Accordingly, the undersigned respectfully requests that the objection be withdrawn.

The Office objected to claims 23 and 24 under 37 C.F.R. 1.75 as being substantially duplicate to claim 12. The undersigned submits that the instant amendments make clear that claims 23 and 24 are not substantially duplicate to claim 12 at least because claim 12 is drawn to an apparatus comprising antenna arrays configured to both transmit a signal and receive a signal, claim 23 is drawn to an apparatus comprising antenna arrays configured to receive a signal, and claim 24 is drawn to an apparatus comprising antenna arrays configured to transmit a signal. Accordingly, the undersigned respectfully requests that the objection be withdrawn.

Rejections under 35 U.S.C. §112, second paragraph

The Office rejected claims 1-24 under 35 U.S.C. §112, second paragraph, as being indefinite. This rejection is respectfully traversed.

Specifically, the Office alleges that in claims 1, 12, 23, and 24 the variable n representing an integer value is indefinite because the claim recites “n different bi-directional beams” and “n multiple-input multiple-output transceivers.” The undersigned respectfully disagrees at least because n merely refers to an integer value, the same integer value each time the variable n is used. For example, if n=3 then the system would comprise 3 different bi-directional beams per antenna array and 3 multiple-input multiple-output transceivers. As such, the rejection under 35

U.S.C. §112, second paragraph, of claims 1, 12, 23, and 24, and the claims that depend therefrom should be withdrawn.

Rejections under 35 U.S.C. §103

The Office rejected claims 1-3, 5-8, 12-14, 16-19, 23, and 24 under 35 U.S.C. §103(a) as unpatentable over Adams in view of Rudrapatna. This rejection is respectfully traversed.

The Office “bears the initial burden of factually supporting any *prima facie* conclusion of obviousness” and must therefore present “a clear articulation of the reason(s) why the claimed invention would have been obvious.” In other words, if the cited references fail to disclose or at least fairly suggest each specific and explicit limitation of the claimed subject matter, the Office can present a valid *prima facie* case for obviousness under 35 U.S.C. §103(a) only by presenting a convincing line of reasoning as to why one of ordinary skill in the art at the time of conception of the instantly claimed subject matter would have reasonably found the claimed invention to have been obvious in light of the teachings of the references. See *e.g.* MPEP §706.02(j) citing *Ex Parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The Office must therefore present a clear rationale supporting the assertion that all of the claimed elements were known in the prior art and that one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, to produce a combination yielding nothing more than predictable results to one of ordinary skill in the art. *KSR*, 82 USPQ2d at 1395. MPEP §2141.02 further notes that “a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). As described in detail below, the combination of the cited references fail

to disclose or suggest the features of the currently pending claims and the Office has not provided a valid *prima facie* case for obviousness under 35 U.S.C. §103(a).

Adams describes an antenna system intended to increase the capacity of a communication system. For a receiver, each array of elements such as 7a, 7b, and 7c in FIG. 6 is an input to the beamformer 8. The output ports 11a, 11b, and 11c correspond to antenna beams produced by the arrays of elements 7a, 7b, and 7c and beamformer 8. Adams goes on to describe that the arrays of antenna elements are often integrated with the beamformer which eliminates direct access to arrays 7a, 7b, and 7c thereby limiting future upgrade strategies of the antenna system. To remove this limitation, Adams describes an inverse beamformer 12 to undo the effects of the beamformer and produce signals 25a and 25b that appear the same as the antenna array outputs 9a and 9c. Adams, FIG. 6, paragraphs [0010], [0058], and [0059].

Claim 1 recites a combination of features including

- m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and
 - a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
 - n multiple-input multiple-output transceivers (MIMO),
- each MIMO transceiver comprising:
 - a MIMO receiver configured to accept m received signals, wherein the i-th input signal to the j-th MIMO receiver corresponds to the j-th beam of the i-th antenna array; and
 - a MIMO transmitter configured to provide m transmit signals, wherein the v-th output signal from the z-th MIMO transmitter corresponding to the z-th beam of the v-th antenna array is selected for transmission,
- wherein m, n, v, and z are integer number values, wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and wherein $n \geq 2$ and $m \geq 2$.

In summary of one aspect of claim 1, each of the “**m** antenna arrays” comprise a “beamformer configured to produce **n** different bi-directional beams” connected to “**n** multiple-input multiple-output transceivers (MIMO)” where each MIMO receiver is “configured to accept **m** received signals” and each MIMO transmitter “configured to provide **m** transmit signals,” wherein **m** and **n** are integer number values greater than 2. Thus, there is the same number (**m**) of arrays as received/transmitted signals per MIMO transceiver. There is also the same number (**n** which may be a different number than **m**) of bi-directional beams per antenna array as MIMO transceivers.

FIG. 6 of Adams describes **3 arrays** of antenna elements 7a, 7b, and 7c. Each array produces **1 beam**. These arrays connect to beamformer 8 to produce 3 ports 11a, 11b, and 11c, each port corresponding to a beam produced by the arrays. Inverse beamformer 25a then reverses the effect of beamformer 8 and produces 2 ports 25a and 25b corresponding to antenna ports 9a and 9b, respectively. Ports 25a and 25b connect to **1 MIMO receiver 17**. As detailed below, this configuration described by Adams does not disclose or suggest the pending claims.

The configuration of Adams has **3 arrays**, **1 beam per array**, and **1 MIMO receiver**. Comparing this to the instant claim 1, **3 arrays** would correspond to **m=3** and **1 beam per array** would correspond to **n=1**. At the outset, claim 1 recites “wherein $n \geq 2$ and $m \geq 2$,” meaning the system of claim 1 has **2 or more beams per array**, and **2 or more MIMO transceivers** in contradiction to the **1 beam per antenna array** and **1 MIMO receiver** of Adams. Moreover, claim 1 with **m=3** would mean each MIMO receiver accepts **3 inputs** and each MIMO transmitter produces **3 outputs**, in contradiction to the **2 inputs to the receiver** in FIG. 6 of Adams.

In summary of another aspect of claim 1, “the **i-th** input signal to the **j-th** MIMO receiver corresponds to the **j-th** beam of the **i-th** antenna array... wherein $i=1, \dots, m, j=1, \dots, n$.” For

example, if $m=3$ and $n=6$, the 3rd input to the 6th MIMO receiver corresponds to the 3rd beam of the 6th array. Similarly, the 2nd input to the 3rd MIMO receiver corresponds to the 2nd beam of the 3rd array, and so on. Nowhere does Adams disclose or suggest the interconnection of multiple antenna arrays with multiple beams to multiple MIMO transceivers each with multiple inputs and outputs, much less the interconnection of components as recited in claim 1.

In view of the forgoing Adams fails to disclose or suggest the features of claim 1. Although Rudrapatna discloses a structure for multiple antennas, Rudrapatna fails to cure the above-noted deficiencies of Adams. Nor does the Office allege that Rudrapatna does. As such, Adams and Rudrapatna, whether taken alone or in combination, fail to disclose or suggest the features of claim 1 and the rejection under 35 U.S.C. §103(a) of claim 1, and claims 2, 3, and 5-8, at least by their dependency, should be withdrawn.

Although of different scope, claims 12, 23, and 24 recite features similar to claim 1. For at least the above-noted reasons with respect to claim 1, the rejection of claims 12, 23, 24, and claims 13, 14, and 16-19, at least by their dependency, should be withdrawn.

The Office rejected claims 9, 10, 20, and 21 under 35 U.S.C. §103(a) as unpatentable over Adams in view of Rudrapatna and Honda. This rejection is respectfully traversed.

Claims 9 and 10 depend from claim 1 and include all of the features of claim 1 including the features noted above. Claims 20 and 21 depend from claim 12 which recites features similar to claim 1. Although, Honda discloses an electromagnetic lens, Honda fails to cure the above-noted deficiencies in Adams and Rudrapatna. Nor does the Office allege that Honda does. As such Adams, Rudrapatna, and Honda, whether taken alone or in combination, fail to disclose or suggest the features of claims 9, 10, 20, and 21, and the rejection of these claims under 35 U.S.C. §103(a) should be withdrawn.

Concluding Remarks

On the basis of the foregoing amendments, the pending claims are in condition for allowance. It is believed that all of the pending claims have been addressed in this paper. However, failure to address a specific rejection, issue or comment, does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above are not intended to be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper.

The Commissioner is hereby authorized to charge any additional fees that may be due, or credit any overpayment of same, to Deposit Account No. 50-0311, Reference No. 43273-513F01US.

Date: September 21, 2012

Respectfully submitted,



David C. Laney, Ph.D.
Reg. No. 66,859

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Electronic Acknowledgement Receipt	
EFS ID:	13813306
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
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Attorney Docket Number:	43273-513F01US
Receipt Date:	21-SEP-2012
Filing Date:	13-APR-2012
Time Stamp:	20:53:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	43273-513F01USresponse.pdf	511029	no	13
			371c7d887e3e1af6084c04e1b5bb7f82504cf24		
Warnings:					
Information:					

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764
64046 7590 01/25/2013 Mintz Levin/San Diego Office One Financial Center Boston, MA 02111			EXAMINER CADEAU, WEDNEL	
			ART UNIT 2632	PAPER NUMBER
			NOTIFICATION DATE 01/25/2013	DELIVERY MODE 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):

IPDocketingBOS@mintz.com
IPFilerombos@mintz.com

Office Action Summary	Application No. 13/447,139		Applicant(s) EIDSON ET AL.	
	Examiner WEDNEL CADEAU		Art Unit 2632	

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

Period for Reply

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

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 21 September 2012.

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

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

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

Disposition of Claims

5) ☒ Claim(s) 1-24 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) 1-24 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 ____ 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).

a) ☐ All b) ☐ Some * c) ☐ None of:

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

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

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

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

Attachment(s)

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

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

3) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.

4) ☐ Other: ____.

DETAILED ACTION

Prior arts used in this office action:

Adams et al. (US 20090322608 A1, hereinafter "Adams")

Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna")

Lou et al (20080240208 A1, hereinafter "Lou")

Honda (US 20050156801 A1, hereinafter "Honda")

Response to Arguments

(1) Applicant's Arguments/Remarks: "FIG. 6 of Adams describes 3 arrays of antenna elements 7a, 7b, and 7c. Each array produces 1 beam. These arrays connect to beamformer 8 to produce 3 ports 11 a, 11 b, and 11 c, each port corresponding to a beam produced by the arrays. Inverse beamformer 25a then reverses the effect of beamformer 8 and produces 2 ports 25a and 25b corresponding to antenna ports 9a and 9b, respectively. Ports 25a and 25b connect to 1 MIMO receiver 17. As detailed below, this configuration described by Adams does not disclose or suggest the pending claims. The configuration of Adams has 3 arrays, 1 beam per array, and 1 MIMO receiver. Comparing this to the instant claim 1, 3 arrays would correspond to $m=3$ and 1 beam per array would correspond to $n=1$. At the outset, claim 1 recites "wherein $n > 2$ and $m \geq 2$," meaning the system of claim 1 has 2 or more beams per array, and 2 or more MIMO transceivers in contradiction to the 1 beam per antenna array and 1 MIMO receiver of Adams. Moreover, claim 1 with $m=3$ would mean each MIMO receiver accepts 3 inputs and each MIMO transmitter produces 3 outputs, in contradiction to the 2 inputs to the receiver in FIG. 6 of Adams."

Examiner's Response: However, one can easily see that the system of Adams includes more than one transceivers since the application is intended for multiple transceivers. for instant, in figures 1-3 cited as prior art the system includes more than one receiver. Also if one takes a look as figure 5, the system again contains multiple radio transceiver. Furthermore in figure 8, a schematic diagram showing an embodiment of Adams invention that includes an inverse beamformer that is designed for multiple radio transceivers. See also previously cited prior art (Honda [0037], fig. 3) for further clarification. Contrary to applicant assertion, Adam does teach that there is more than one beam per array. Adams discloses at least three radiation beams and further discloses that capacity can be increase by further subdividing the azimuth plane more finely to produce more beams. As a result, one skill in the art would recognize that the system of Adams includes more than one receiver and more than one beam per array.

Claim Rejections - 35 USC § 103

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

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

Claims 1-3, 5-8, 12-14, 16-19, 23, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 20090322608 A1, hereinafter "Adams") in view of Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna").

Regarding claims 1, 12, 23, 24:

Adams teaches a system comprising:

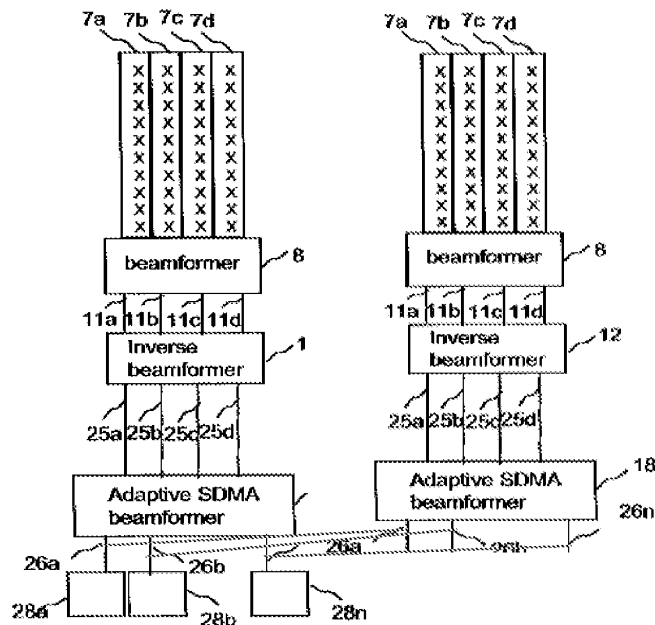
a plurality of m antennas arrays configured to receive a propagating radio frequency signal (*Adams [0004], figs. 3, 5, where Adams gives an overview of the system in relation to prior arts and that such systems usually composed of arrays of antenna elements*), each of the antenna arrays comprising:

a plurality of antenna elements (*Adams [0004], where Adams discloses arrays that are composed of a plurality of antenna elements*); and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements (*Adams [0070], where Adams discloses a beam former (8) that produce several bi-directional beams*); and

a plurality of n multiple-input multiple-output transceivers (MIMO) comprising (*Adams [0004], [0040]-[0041], [0050], [0057], figs. 3, 5-8, 16, and 17, where Adams discloses a several MIMO transceivers*), each MIMO transceiver;

a MIMO receiver configured to accept m received signals, wherein the i-th input signal to the j-th MIMO receiver corresponds to the j-th beam of the i-th antenna array (*Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, although Adams only shows one antenna array, he discloses that the signals received at individual antenna element (7a) are connected to a respective individual element output of the inverse beamformer 25a, therefore it would have been obvious to one with ordinary skill in the art to recognize that if more than one arrays were illustrated all the elements (7a) from each array would end up combined together to form (25a) and so on.. and associate (25a) to a particular MIMO transceiver like in figs. 8 and 17*);



and

a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission, wherein m , n , v , and z are integer number values, and wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$ (Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, since Adams system is a transceiver it is safe to say that the same principle would apply on the reverse link).

Wherein m is greater or equal to 2 (Adams fig. 6).

Although implicitly one can see that the system of Adams performs both transmission and reception via antennal elements 7a-7d, however, in other to be more explicit one can rely on the teaching of Rudrapatna. Rudrapatna discloses a plurality of arrays of antenna elements in a beamforming MIMO where antenna elements and/or arrays of antennas are selected to perform transmission or reception as necessary (Rudrapatna [0017]-[0019], figs 1 and 2).

Therefore, taking the teaching of Adams and Rudrapatna as a whole it would have been obvious to one with ordinary skill in the art to arrive at the claimed invention such that transmission and reception from a particular user can be determined and process accordingly in a full duplex communication system.

The combination above fails to explicitly teach wherein n is greater or equal to 2. meaning the system has more than one receiver.

However, one can easily see that the system of Adams includes more than one transceiver, since the application is intended for multiple transceivers. for instant, in figures 1-3 cited as prior art the system includes more than one receiver. Also if one takes a look as figure 5, the system again contains multiple radio transceiver. Furthermore in figure 8, a schematic diagram showing an embodiment of Adams invention that includes an inverse beamformer that is designed for multiple radio transceivers. Therefore, it would have been obvious to one with ordinary skill in the art such that receivers of figure 8 bypass the adaptive SDMA Beamformer if the system is intended for MIMO System. Contrary to applicant assertion, Adam does teach that there is more than one beam per array. Adams discloses at least three radiation beams and further discloses that capacity can be increase by further subdividing the azimuth plane more finely to produce more beams. See also previously cited prior art (Honda [0037], fig. 3) for further clarification.

Regarding claims 2 and 13:

Adams in view of Rudrapatna teaches wherein $z = [\text{one value between } 1 \text{ and } n]$ (Adams [0008], fig. 5).

Regarding claims 3 and 14:

Adams teaches wherein $z = 1, \dots, n$ (*Adams [0008], figs. 5, 7*).

Regarding claims 5 and 16:

Adams in view of Rudrapatna wherein $m=3$ and $n=6$ (*Rudrapatna [0011], figs. 1 and 2, where Rudrapatna teaches that the system contains at least two antenna groups and each groups contains at least two pairs of antennas*).

Regarding claims 6 and 17:

Adams teaches all the limitation of this claim except wherein the antenna arrays are separated by a distance more than one wavelength.

Rudrapatna teaches a beamforming MIMO system wherein the antenna groups are separated by more the one wavelength (*Rudrapatna [0031]*).

Therefore, taking the teaching of Adams and Rudrapatna as a whole, it would have been obvious to one with ordinary skill in the art at the time the invention was made to arrive at the claimed invention, in order to perform simultaneously beamforming and MIMO communication.

Regarding claims 7 and 18:

Adams teaches wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency (*Adams [0073]*).

Regarding claims 8 and 19:

Adams in view of Rudrapatna teaches wherein the beamformer is an electronic beamformer (*Adams [0008], fig. 4; Rudrapatna [0024]*).

Regarding claims 11 and 22:

Adams in view of Rudrapatna teaches wherein the system simultaneously provides MIMO and beam forming (*Rudrapatna [0031]*).

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 20090322608 A1, hereinafter "Adams") in view of Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna"), and in view of Lou et al (20080240208 A1, hereinafter "Lou").

Regarding claims 4 and 15:

Adams in view of Rudrapatna teaches all the limitation of this claim except wherein the system is configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11 a/b/g/n/ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3 GPP) Long Term Evolution (LTE), 3 GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

However Lou teaches and adaptive switching techniques for Hybrid automatic repeat request systems where MIMO beamforming in accordance with many standards including for instance, 3GPP LTE, 3GPP2, IEEE 802.11, WiMAX, and so on..

Therefore, taking the teaching of Adams, Rudrapatna, and Lou as a whole, it would have been obvious to one with ordinary skill in the art to arrive at the claimed invention, the reason being to develop a system that is compatible to many systems currently being used in the field, thereby a system that would have a broad application since most systems are being built to conform the standards developed by the engineering body or bodies responsible to coordinate the technology advancements.

Claims 9-10, 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 20090322608 A1, hereinafter "Adams") in view of Rudrapatna (US

20020132600 A1, hereinafter “Rudrapatna”), and in view of Honda (US 20050156801 A1, hereinafter “Honda”).

Regarding claims 9, 10, 20, 21:

Adams in view of Rudrapatna teaches all the limitation of this claim except wherein the lens is a Honda or Rotman lens.

Honda teaches and antenna array that comprise an electromagnetic lens (hence Honda lens) and also teaches that it is customary to use also Rotman lens in those type of systems (Honda [0008], [0035]-[0036], fig. 5).

Therefore, taking the teaching of Adams, Rudrapatna, and Honda as a whole, it would have been obvious to one with ordinary skill in the art at the time the invention was made to arrive at the claimed invention, since using Honda and/or Rotman lens in antenna array are well known in the art for their performance, such as to improve viability and versatility of wireless communication and beamforming options (Honda [0007]).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WEDNEL CADEAU whose telephone number is (571)270-7843. The examiner can normally be reached on M-TH 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WEDNEL CADEAU/
Examiner, Art Unit 2632
December 12, 2012

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2632

Notice of References Cited	Application/Control No. 13/447,139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.	
	Examiner WEDNEL CADEAU	Art Unit 2632	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2009/0322608	12-2009	Adams et al.	342/368
*	B	US-2002/0132600	09-2002	Rudrapatna, Ashok N.	455/277.1
*	C	US-2008/0240208	10-2008	Lou et al.	375/211
*	D	US-2005/0156801	07-2005	Honda, Royden M.	343/754
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

<i>Search Notes</i> 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2611

SEARCHED			
Class	Subclass	Date	Examiner
375	267, 211, 146, 347	6/25/2012	WC
455	277.1, 63.4, 63.1	6/25/2012	WC

SEARCH NOTES		
Search Notes	Date	Examiner
Plus Search	6/25/2012	WC
Inventor Search	6/25/2012	WC
IEEE Search (update search 12/05/2012)	6/25/2012	WC
Google Search (update search 12/05/2012)	6/25/2012	WC
NPL Search	6/25/2012	WC

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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<i>Index of Claims</i> 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2611

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

☐ Claims renumbered in the same order as presented by applicant				☐ CPA				☐ T.D.				☐ R.1.47			
CLAIM		DATE													
Final	Original	06/26/2012	12/12/2012												
	1	✓	✓												
	2	✓	✓												
	3	✓	✓												
	4	✓	✓												
	5	✓	✓												
	6	✓	✓												
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	21	✓	✓												
	22	✓	✓												
	23	✓	✓												
	24	✓	✓												

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	0	"13447139"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:03
S2	486	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:10
S3	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S4	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S5	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj2 direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S6	1	"6980169"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:31
S7	4	("20040174299" "20040223476" "20040224637" "20050075070").PN. OR ("6980169").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 09:38
S8	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same arrays and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S9	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same "arrays" and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S10	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S11	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S12	0	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former) and (signal near condition\$4)	USPAT	OR	ON	2012/06/25 12:00
S13	13	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT	OR	ON	2012/06/25 12:02
S14	0	"20090103593"	USPAT	OR	ON	2012/06/25 12:29
S15	2	"20090103593"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 12:29

EAST Search History

S16	0	"10760023"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:00
S17	1	"20050156801"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:01
S18	0	"13447139"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 15:21
S19	48	(US-20060264184-\$ or US-20080304463-\$ or US-20080304464-\$ or US-20090203405-\$ or US-20100304666-\$ or US-20120046003-\$ or US-20060239366-\$ or US-20060239372-\$ or US-20060239373-\$ or US-20060239374-\$ or US-20060239375-\$ or US-20060291544-\$ or US-20070015543-\$ or US-20070210960-\$ or US-20070225033-\$ or US-20080285637-\$ or US-20080318524-\$ or US-20090046768-\$ or US-20090161739-\$ or US-20090325515-\$ or US-20100150254-\$ or US-20100171661-\$ or US-20100234071-\$ or US-20110199968-\$ or US-20110228749-\$ or US-20110280341-\$).did. or (US-20120112962-\$).did. or (US-7751494-\$ or US-7769098-\$ or US-7502408-\$ or US-7574236-\$ or US-7619997-\$ or US-7693551-\$ or US-7714780-\$ or US-7738583-\$ or US-7738584-\$ or US-7986650-\$ or US-8040970-\$ or US-8045926-\$ or US-8085871-\$ or US-8120532-\$ or US-8126040-\$ or US-8180285-\$ or US-8184679-\$ or US-7809074-\$ or US-7893871-\$ or US-7917176-\$ or US-7961807-\$).did.	US-PGPUB; USPAT	OR	ON	2012/06/25 15:23
S20	45	((DONALD) near2 (EIDSON)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:29
S21	3	((DONALD) near2 (EIDSON)).INV. and beam\$6	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:30
S22	0	((RONALD) near2 (CHAFFEE)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:32
S23	2989	(antenna adj arrays) with (spacing or distance or wavelength)	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:36
S24	84	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:37
S26	2	"20080240208"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/26 10:22

EAST Search History (Interference)

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S25	0	"13447139"	US-PGPUB; USPAT; UPAD	OR	ON	2012/06/25 15:22

12/ 12/ 2012 1:40:07 PM

C:\ Users\ wcadeau\ Documents\ EAST\ Workspaces\ 13447139.wsp

Docket No.: 43273-513F01US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Design Application of:
Donald B. Eidson et al.

Application No.: 13/447,139

Confirmation No.: 4764

Filed: April 13, 2012

Art Unit: 2611

For: Directed MIMO Communications

Examiner: W. Cadeau

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

REPLY TO FINAL ACTION MAILED JANUARY 25, 2013

In response to the Final Office Action dated January 25, 2013, reconsideration and allowance of the above-identified U.S. patent application is requested in light of the following remarks:

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

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE CLAIMS

Please replace all prior listings of claims with the following listing of claims.

Listing of Claims:

1. (Currently Amended) A system comprising:

m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to ~~accept~~ process m different received signals, wherein ~~the~~ an i-th input received signal to ~~a~~ a the j-th MIMO receiver corresponds to ~~the~~ a j-th beam of ~~an~~ the i-th antenna array; and

a MIMO transmitter configured to ~~provide~~ process m different transmit signals, wherein ~~the~~ a v-th output transmit signal from ~~the~~ a z-th MIMO transmitter ~~corresponding~~ corresponds to the a z-th beam of the a v-th antenna array is selected for transmission,

wherein m, n, v, and z are integer number values,

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

2. (Original) The system of claim 1, wherein $z = [\text{one value between 1 and } n]$.

3. (Original) The system of claim 1, wherein $z = 1, \dots, n$.
4. (Original) The system of claim 1, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n /ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.
5. (Original) The system of claim 1, wherein $m=3$ and $n=6$.
6. (Original) The system of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.
7. (Original) The system of claim 1, wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency.
8. (Original) The system of claim 1, wherein the beamformer is an electronic beamformer.
9. (Original) The system of claim 1, wherein the antenna array further comprises a lens.
10. (Original) The system of claim 9, wherein the lens is a Honda or Rotman lens.

11. (Previously Presented) The system of claim 1, wherein the system simultaneously provides MIMO and beamforming.

12. (Currently Amended) An apparatus comprising:

m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to ~~accept~~ process m different received signals, wherein the ~~an i-th input received~~ signal to a ~~the j-th~~ MIMO receiver corresponds to the ~~a j-th~~ beam of the ~~an i-th~~ antenna array; and

a MIMO transmitter configured to ~~provide~~ process m different transmit signals,

wherein the ~~a v-th output transmit~~ signal from the ~~a z-th~~ MIMO transmitter ~~corresponding~~ corresponds to the ~~a z-th~~ beam of the ~~a v-th~~ antenna array ~~is selected for~~ transmission,

wherein m, n, v, and z are integer number values, and

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

13. (Original) The apparatus of claim 12, wherein $z = [\text{one value between } 1 \text{ and } n]$.
14. (Original) The apparatus of claim 12, wherein $z = 1, \dots, n$.
15. (Original) The apparatus of claim 12, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.
16. (Original) The apparatus of claim 12, wherein $m=3$ and $n=6$.
17. (Previously Presented) The apparatus of claim 12, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.
18. (Original) The apparatus of claim 12, wherein the antenna elements are less than one half wavelength apart at the carrier frequency.
19. (Original) The apparatus of claim 12, wherein the beamformer is an electronic beamformer.
20. (Original) The apparatus of claim 12, wherein the antenna array further comprises a lens.

21. (Original) The apparatus of claim 12, wherein the lens is a Honda or Rotman lens.

22. (Currently Amended) The apparatus of claim 12, wherein the ~~system~~ apparatus simultaneously provides MIMO and beamforming.

23. (Currently Amended) An apparatus comprising:

m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different receive beams using the plurality of antenna elements; and

n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to ~~accept~~ process m different received signals, wherein the an i-th input received signal to the a j-th MIMO receiver corresponds to the a j-th beam of the an i-th antenna array,

wherein m and n are integer number values, and

wherein $i=1, \dots, m$, and $j=1, \dots, n$, and

wherein $n \geq 2$ and $m \geq 2$.

24. (Currently Amended) An apparatus comprising:

m antenna arrays configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different transmit beams using the plurality of antenna elements; and

n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to ~~provide~~ process m different transmit signals, wherein ~~the~~ a -th ~~output~~ transmit signal from ~~the~~ a -th MIMO transmitter corresponding to ~~the~~ a -th beam of ~~the~~ a -th antenna array is selected for transmission,

wherein m , n , v , and z are integer number values, and

wherein $j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

REMARKS

The Office rejected claims 1-3, 5-8, 12-14, 16-19, 23, and 24 under 35 U.S.C. §103(a) as unpatentable over U.S. Patent Application Publication No. 2009/0322608 to Adams et al. (hereinafter "Adams") and U.S. Patent Application Publication No. 2002/0132600 to Rudrapatna (hereinafter "Rudrapatna"); rejected claims 4 and 15 under 35 U.S.C. §103(a) as unpatentable over Adams, Rudrapatna, and U.S. Patent Application Publication No. 2008/0240208 to Lou et al. (hereinafter "Lou"); and rejected claims 9, 10, 20, and 21 under 35 U.S.C. §103(a) as unpatentable over Adams, Rudrapatna, and U.S. Patent Application Publication No. 2005/0156801 to Honda (hereinafter "Honda").

By this Amendment, claims 1, 12, 22, 23, and 24 are amended to improve form. No new matter has been added.

The Office rejected claims 1-3, 5-8, 12-14, 16-19, 23, and 24 under 35 U.S.C. §103(a) as unpatentable over Adams and Rudrapatna. These rejections are respectfully traversed.

The Office "bears the initial burden of factually supporting any *prima facie* conclusion of obviousness" and must therefore present "a clear articulation of the reason(s) why the claimed invention would have been obvious." In other words, if the cited references fail to disclose or suggest each specific and explicit limitation of the claimed subject matter, the Office can present a valid *prima facie* case for obviousness under 35 U.S.C. §103(a) only by presenting a convincing line of reasoning as to why one of ordinary skill in the art at the time of conception of the instantly claimed subject matter would have reasonably found the claimed invention to have been obvious in light of the teachings of the references. See *e.g.* MPEP §706.02(j) citing *Ex Parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The Office must therefore present a clear rationale

supporting the assertion that all of the claimed elements were known in the prior art and that one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, to produce a combination yielding nothing more than predictable results to one of ordinary skill in the art. *KSR*, 82 USPQ2d at 1395. MPEP §2141.02 further notes that “a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

Adams describes an antenna system that includes multiple antenna arrays, a beamformer, and an inverse beamformer. For example, FIG. 6 of Adams includes antenna arrays 7a, 7b, and 7c, beamformer 8, and inverse beamformer 12. Adams describes that many antenna systems are developed to use multiple antennas (or arrays of antennas such as 7a, 7b, 7c in FIG. 6) and a beamformer to produce one or more beams using the multiple antennas. The beams are produced by the beamformer by weighting and phase shifting the signals 9a, 9b, 9c, from the multiple antennas 7a, 7b, 7c, and combining them into one signal 11a, 11b, 11c for each beam. The resulting beams provides signal sensitivity in a particular direction determined by the antennas, weighting, and phase shifts of the signals that are combined.

Adams describes that because of cost, size, and performance, beamformers are often integrated with the multiple antennas and often located on an antenna tower. See Adams, paragraph, [0009]. Adams goes on to explain that sometime after installation, an upgrade may need to be performed that requires access to signals 9a, 9b, 9c from the multiple antennas. However, because the beamformer is integrated with the antennas, direct access to the antenna signals 9a, 9b, 9c is not possible. To overcome this problem, Adams describes an inverse beamformer that is used

to undo the effect of the beamformer. The net result of the beamformer combined with the inverse beamformer is to provide signals equivalent to the original signals 9a, 9b, 9c at the antennas. Also see, Adams, FIG. 6, paragraphs [0010], [0058], and [0059].

The inverse beamformer (e.g. 12 in FIG 6) is used to undo the effect of the beamformer (e.g. 8 in FIG 6) in order to produce signals (e.g. 25a and 25c in FIG. 6.) equivalent to the original antenna signals (e.g. 9a and 9c in FIG. 6). In the example of FIG. 6, only two signals are produced (25a and 25c) which correspond to signals (9a and 9c) from two of the three antennas (7a and 7c). The two signals 25a and 25c are connected to one MIMO receiver. In another example, FIG. 8 of Adams, signals 25a, 25b, 25c from the inverse beamformer 18 correspond to the antenna signals 9a, 9b, 9c from antenna arrays 7a, 7b, 7c. FIG. 8 further shows an adaptive SDMA beamformer that produces signals corresponding to the individual elements of arrays 7a, 7b, 7c. Each signal from the adaptive SDMA beamformer 26a, ..., 28n connects to a single transceiver (not a MIMO transceiver).

In contrast, claim 1 recites a combination of features including:

- m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

- a plurality of antenna elements; and
 - a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
 - n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

- a MIMO receiver configured to process m different received signals, wherein the an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and

- a MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a z-th beam of a v-th antenna array,

- wherein m, n, v, and z are integer number values,
wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and
wherein $n \geq 2$ and $m \geq 2$.

In contrast to Adams, in one aspect of claim 1, each of the “antenna arrays” comprises a “beamformer configured to produce n different bi-directional beams” connected to “ n multiple-input multiple-output (MIMO) transceivers.” For example, if each of the antenna arrays has 3 beams, there will be 3 MIMO transceivers. However, FIG. 6 of Adams conflicts with claim 1 by disclosing 3 *beams*, 1 for each array (7a, 7b, 7c) and 1 *MIMO transceiver* 17. FIG. 7 of Adams conflicts with claim 1 by disclosing 6 *beams*, 2 (one for each of two polarizations) for each of the 3 antenna arrays (7a, 7b, 7c) and 1 *MIMO transceiver* 17. Adams at FIG.s 3, 5, and 8 show standard transceivers and not MIMO transceivers. **Thus, nowhere does Adams describe an implementation where the number of beams per antenna array is equal to the number of MIMO transceivers.** As such, Adams fails to disclose the claim 1 “a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and n multiple-input multiple-output transceivers.”

Moreover, claim 1 requires each of the MIMO receivers is “configured to accept m received signals”, each MIMO transmitter “is configured to provide m transmit signals,” associated with the m arrays. For example, claim 1 requires that for 3 arrays, there must be 3 receive inputs and 3 transmit outputs for each MIMO transceiver. However, Adams at FIG. 6 conflicts with claim 1 by disclosing 3 *arrays* connected to a MIMO transceiver with 2 *inputs and 2 outputs*. Adams at FIG. 7 conflicts with claim 1 by disclosing 3 *arrays* connected to a MIMO transceiver with 2 *inputs and 2 outputs*. **Thus, nowhere does Adams describe an implementation where the number of inputs/outputs per MIMO transceiver is equal to the number of antenna arrays.** As such, Adams fails to disclose the claim 1 “ m antenna arrays” and “a MIMO receiver configured to process

m different received signals” and “a MIMO transmitter configured to process m different transmit signals.”

In view of the forgoing Adams fails to disclose or suggest the features of claim 1 including “m antenna arrays ... each of the antenna arrays comprising: a plurality of antenna elements; and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising: a MIMO receiver configured to process m different received signals ... and a MIMO transmitter configured to process m different transmit signals.” Although Rudrapatna describes a structure for multiple antennas, Rudrapatna fails to cure the above-noted deficiencies of Adams. Nor does the Office allege that Rudrapatna does. As such, Adams and Rudrapatna, whether taken alone or in combination, fail to disclose or suggest the features of claim 1 and the rejection under 35 U.S.C. §103(a) of claim 1, and claims 2, 3, and 5-8, at least by their dependency, should be withdrawn.

Although of different scope, claims 12, 23, and 24 recite features similar to claim 1. For at least the above-noted reasons with respect to claim 1, the rejection of claims 12, 23, 24, and claims 13, 14, and 16-19, at least by their dependency, should be withdrawn.

The Office rejected claims 4 and 15 under 35 U.S.C. §103(a) as unpatentable over Adams, Rudrapatna, and Lou. These rejections are respectfully traversed.

Claim 4 depends from claim 1 and includes all the features of claim 1 including “m antenna arrays ... each of the antenna arrays comprising: a plurality of antenna elements; and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising: a MIMO

receiver configured to process m different received signals ... and a MIMO transmitter configured to process m different transmit signals” Claim 15 depends from claim 12, and claim 12 recites similar features to claim 1. Although Lou describes adaptive switching techniques, Lou fails to cure the above-noted deficiency in Adams and Rudrapatna. Nor does the Office allege that Lou does cure the deficiency of Adams and Rudrapatna. For at least the reasons noted above with respect to claim 1, Adams, Rudrapatna, and Lou, whether taken alone or in combination, fail to disclose or suggest the features of claims 4 and 15, and the rejection of these claims under 35 U.S.C. §103(a) should be withdrawn.

The Office rejected claims 9, 10, 20, and 21 under 35 U.S.C. §103(a) as unpatentable over Adams, Rudrapatna, and Honda. This rejection is respectfully traversed.

Claims 9 and 10 depend from claim 1 and include all of the features of claim 1 including the features noted above. Claims 20 and 21 depend from claim 12 which recites features similar to claim 1. Although, Honda describes an electromagnetic lens, Honda fails to cure the above-noted deficiency in Adams and Rudrapatna. Nor does the Office allege that Honda does cure the deficiency of Adams and Rudrapatna. As such, Adams, Rudrapatna, and Honda, whether taken alone or in combination, fail to disclose or suggest the features of claims 9, 10, 20, and 21, and the rejection of these claims under 35 U.S.C. §103(a) should be withdrawn.

CONCLUSION

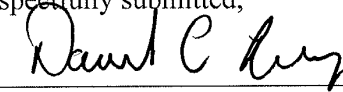
On the basis of the foregoing amendments, the pending claims are in condition for allowance. It is believed that all of the pending claims have been addressed in this paper. However, failure to address a specific rejection, issue or comment, does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above are not intended to be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper.

The Commissioner is hereby authorized to charge any additional fees that may be due, or credit any overpayment of same, to Deposit Account No. 50-0311, Reference No. 43273-513F01US.

Dated: March 25, 2013

Respectfully submitted,

By



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Electronic Acknowledgement Receipt	
EFS ID:	15342618
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
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First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
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Application Type:	Utility under 35 USC 111(a)

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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		43273-513F01US_RespFOA.pdf	534398	yes	14
			11e6f7eb8898f070f60ccde1c1b6ab3a4000ecab		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment After Final	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	14
Warnings:			
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Total Files Size (in bytes):		534398	
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<u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.			
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<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.			

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 13/447,139		Filing Date 04/13/2012		☐ To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)			SMALL ENTITY ☒ OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	03/25/2013	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 24	Minus	** 24	= 0	X \$40 =	0	OR	X \$ =	
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X \$210 =	0	OR	X \$ =	
☐ Application Size Fee (37 CFR 1.16(s))										
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
						TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE	
(Column 1)			(Column 2)			(Column 3)				
AMENDMENT	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))										
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.										
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".										
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".										
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

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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Legal Instrument Examiner:
/TRACIE ROBERTSON/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764
64046 7590 04/24/2013 Mintz Levin/San Diego Office One Financial Center Boston, MA 02111			EXAMINER CADEAU, WEDNEL	
			ART UNIT 2632	PAPER NUMBER
			NOTIFICATION DATE 04/24/2013	DELIVERY MODE 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):

IPDocketingBOS@mintz.com
IPFilerombos@mintz.com

Advisory Action Before the Filing of an Appeal Brief	Application No. 13/447,139	Applicant(s) EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2632

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

THE REPLY FILED 25 March 2013 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☐ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:

a) ☐ The period for reply expires _____ months from the mailing date of the final rejection.

b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires _____ months from the mailing date of the prior *Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because

a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);

b) ☐ They raise the issue of new matter (see NOTE below);

c) ☒ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. ☐ Applicant's reply has overcome the following rejection(s): _____.

6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. ☐ For purposes of appeal, the proposed amendment(s): (a) ☐ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

9. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.

12. ☐ Note the attached Information *Disclosure Statement(s)*. (PTO/SB/08) Paper No(s). _____

13. ☐ Other: _____.

STATUS OF CLAIMS

14. The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: _____

Claim(s) objected to: _____

Claim(s) rejected: 1-24.

Claim(s) withdrawn from consideration: _____

/CHIEH M FAN/ Supervisory Patent Examiner, Art Unit 2632	/WEDNEL CADEAU/ Examiner, Art Unit 2632
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Continued from 3: the limitation "A MIMO receiver configure to process m different received signals wherein an i -th received signal to a j -th MIMO receiver corresponds to a j -th beam of an i -th antenna array" requires further consideration and search.

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

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

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

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)							
Application Number	13447139	Filing Date	2012-04-13	Docket Number (if applicable)	43273-513F01US	Art Unit	2632
First Named Inventor	Donald B. Eidson			Examiner Name	W. Cadeau		
This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV							
SUBMISSION REQUIRED UNDER 37 CFR 1.114							
Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).							
☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.							
☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____							
☐ Other _____							
☐ Enclosed							
☐ Amendment/Reply							
☐ Information Disclosure Statement (IDS)							
☐ Affidavit(s)/ Declaration(s)							
☐ Other _____							
MISCELLANEOUS							
☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)							
☐ Other _____							
FEES							
The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed. ☐ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____							
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED							
☒ Patent Practitioner Signature							
☐ Applicant Signature							

Doc code: RCEX

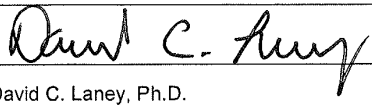
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

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

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

Signature of Registered U.S. Patent Practitioner			
Signature		Date (YYYY-MM-DD)	2013-04-25
Name	David C. Laney, Ph.D.	Registration Number	66859

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

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

Privacy Act Statement

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

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

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

Electronic Patent Application Fee Transmittal				
Application Number:		13447139		
Filing Date:		13-Apr-2012		
Title of Invention:		DIRECTED MIMO COMMUNICATIONS		
First Named Inventor/Applicant Name:		Donald Brian Eidson		
Filer:		David C. Laney/Seton Carr		
Attorney Docket Number:		43273-513F01US		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for Continued Examination	2801	1	600	600
Total in USD (\$)				600

Electronic Acknowledgement Receipt	
EFS ID:	15616002
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	David C. Laney/Seton Carr
Filer Authorized By:	David C. Laney
Attorney Docket Number:	43273-513F01US
Receipt Date:	25-APR-2013
Filing Date:	13-APR-2012
Time Stamp:	18:18:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 600
RAM confirmation Number	5096
Deposit Account	500311
Authorized User	LANEY, DAVID
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	43273-513F01US_RCE.pdf	169318	no	3
			6c19423717a81d402b876ebec83b5014b3 c71138		
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30109	no	2
			6dc186a0121a002e49e858d3bf40e15ed62 0b1f0		
Warnings:					
Information:					
Total Files Size (in bytes):			199427		
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.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Design Application of:
Donald B. Eidson et al.

Application No.: 13/447,139

Confirmation No.: 4764

Filed: April 13, 2012

Art Unit: 2611

For: Directed MIMO Communications

Examiner: W. Cadeau

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

STATEMENT OF SUBSTANCE OF TELEPHONIC INTERVIEW
AND
SUPPLEMENTAL AMENDMENT

Further to the telephonic interview between the undersigned and the Examiner on September 18, 2013, and further to the Request for Continued Examination filed April 25, 2013, reconsideration and allowance of the above-identified U.S. patent application is requested in light of the following:

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

Statement of Substance and Remarks begin on page 8 of this paper.

AMENDMENTS TO THE CLAIMS

Please replace all prior listings of claims with the following listing of claims.

Listing of Claims:

1. (Currently Amended) A system comprising:
 - m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and
 - a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
 - n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:
 - a MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and
 - a MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a z-th beam of a v-th antenna array,
- wherein m, n, v, and z are integer number values,
- wherein $i=1, \dots, m, j=1, \dots, n$, and $v=1, \dots, m$, and
- wherein $n \geq 2$ and $m \geq 2$, and
- wherein z equals one or more values between 2 and n.

2. (Currently Amended) The system of claim 1, wherein $z = 1, \dots, w$, wherein $n \geq w \geq 2$ ~~{one value between 1 and n}~~.
3. (Cancelled)
4. (Original) The system of claim 1, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.
5. (Original) The system of claim 1, wherein $m=3$ and $n=6$.
6. (Original) The system of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.
7. (Original) The system of claim 1, wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency.
8. (Original) The system of claim 1, wherein the beamformer is an electronic beamformer.
9. (Original) The system of claim 1, wherein the antenna array further comprises a lens.

10. (Original) The system of claim 9, wherein the lens is a Honda or Rotman lens.

11. (Previously Presented) The system of claim 1, wherein the system simultaneously provides MIMO and beamforming.

12. (Currently Amended) An apparatus comprising:

m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and

a MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a z-th beam of a v-th antenna array,

wherein m, n, v, and z are integer number values, and

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$, and

wherein z equals one or more values between 2 and n.

13. (Currently Amended) The apparatus of claim 12, wherein $z = 1, \dots, w$, wherein $n \geq w \geq 2$ ~~[one value between 1 and n]~~.

14. (Cancelled)

15. (Original) The apparatus of claim 12, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

16. (Original) The apparatus of claim 12, wherein $m=3$ and $n=6$.

17. (Previously Presented) The apparatus of claim 12, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

18. (Original) The apparatus of claim 12, wherein the antenna elements are less than one half wavelength apart at the carrier frequency.

19. (Original) The apparatus of claim 12, wherein the beamformer is an electronic beamformer.

20. (Original) The apparatus of claim 12, wherein the antenna array further comprises a lens.

21. (Original) The apparatus of claim 12, wherein the lens is a Honda or Rotman lens.

22. (Previously Presented) The apparatus of claim 12, wherein the apparatus simultaneously provides MIMO and beamforming.

23. (Previously Presented) An apparatus comprising:

m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different receive beams using the plurality of antenna elements; and

n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array,

wherein m and n are integer number values, and

wherein $i=1, \dots, m$, and $j=1, \dots, n$, and

wherein $n \geq 2$ and $m \geq 2$.

24. (Currently Amended) An apparatus comprising:

m antenna arrays configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different transmit beams using the plurality of antenna elements; and

n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponding to a z-th beam of a v-th antenna array is selected for transmission,

wherein m, n, v, and z are integer number values, and

wherein $z=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

STATEMENT OF SUBSTANCE AND REMARKS

At the outset, the undersigned would like to thank Examiner Cadeau for participating in the Examiner initiated telephonic interview on September 18, 2013. The undersigned and the Examiner discussed the pending claims, and the Examiner suggested amendments that he said may be allowable.

By this amendment, Applicant amends claims 1, 2, 12, 13, and 24, to clarify the features of those claims, and cancels claims 3 and 14 without prejudice or disclaimer. No new matter has been added.

The instant amendments reflect the amendments that the Examiner suggested may be allowable. As such, prompt and favorable action is requested.

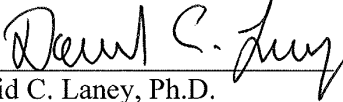
CONCLUSION

On the basis of the foregoing amendments, the pending claims are in condition for allowance. It is believed that all of the pending claims have been addressed in this paper. However, failure to address a specific rejection, issue or comment, does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above are not intended to be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper.

The Commissioner is hereby authorized to charge any additional fees that may be due, or credit any overpayment of same, to Deposit Account No. 50-0311, Reference No. 43273-513F01US.

Dated: September 23, 2013

Respectfully submitted,

By 

David C. Laney, Ph.D.

Registration No.: 66,859

MINTZ LEVIN COHN FERRIS GLOVSKY
AND POPEO, P.C.

3580 Carmel Mountain Road
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San Diego, California 92130-6768
(858) 314-1500

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Agent for Applicant

Electronic Acknowledgement Receipt	
EFS ID:	16942883
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	David C. Laney
Filer Authorized By:	
Attorney Docket Number:	43273-513F01US
Receipt Date:	24-SEP-2013
Filing Date:	13-APR-2012
Time Stamp:	17:10:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment		no			
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		43273-513F01US_StmtSubstSuppAmdt.pdf	254087	yes	9
			52e84d96a4702e99b3001e55fda96068cc20ba22		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Supplemental Response or Supplemental Amendment	1	1
	Claims	2	7
	Applicant summary of interview with examiner	8	9
Warnings:			
Information:			
Total Files Size (in bytes):		254087	
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.			

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

PATENT APPLICATION FEE DETERMINATION RECORD				Application or Docket Number		Filing Date		☐ To be Mailed	
Substitute for Form PTO-875				13/447,139		04/13/2012			
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO									
APPLICATION AS FILED – PART I									
(Column 1)		(Column 2)							
FOR	NUMBER FILED	NUMBER EXTRA		RATE (\$)		FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A					
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A					
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A					
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		X \$ =					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		X \$ =					
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL					
APPLICATION AS AMENDED – PART II									
(Column 1)		(Column 2)		(Column 3)					
AMENDMENT	09/24/2013	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 22	Minus	** 24	= 0	X \$40 =		0	
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X \$210 =		0	
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE		0	
(Column 1)		(Column 2)		(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.									
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".									
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".									
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									

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

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

OK to be entered

/W.C./

Docket No.: 43273-513F01US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Design Application of:
Donald B. Eidson et al.

Application No.: 13/447,139

Confirmation No.: 4764

Filed: April 13, 2012

Art Unit: 2611

For: Directed MIMO Communications

Examiner: W. Cadeau

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

STATEMENT OF SUBSTANCE OF TELEPHONIC INTERVIEW
AND
SUPPLEMENTAL AMENDMENT

Further to the telephonic interview between the undersigned and the Examiner on September 18, 2013, and further to the Request for Continued Examination filed April 25, 2013, reconsideration and allowance of the above-identified U.S. patent application is requested in light of the following:

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

Statement of Substance and Remarks begin on page 8 of this paper.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	0	"13447139"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:03
S2	486	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:10
S3	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S4	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S5	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj2 direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S6	1	"6980169"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:31
S7	4	("20040174299" "20040223476" "20040224637" "20050075070").PN. OR ("6980169").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 09:38
S8	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same arrays and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S9	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same "arrays" and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S10	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S11	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S12	0	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former) and (signal near condition\$4)	USPAT	OR	ON	2012/06/25 12:00
S13	13	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT	OR	ON	2012/06/25 12:02
S14	0	"20090103593"	USPAT	OR	ON	2012/06/25 12:29
S15	2	"20090103593"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 12:29

S16	0	"10760023"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:00
S17	1	"20050156801"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:01
S18	0	"13447139"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 15:21
S19	48	(US-20060264184-\$ or US-20080304463-\$ or US-20080304464-\$ or US-20090203405-\$ or US-20100304666-\$ or US-20120046003-\$ or US-20060239366-\$ or US-20060239372-\$ or US-20060239373-\$ or US-20060239374-\$ or US-20060239375-\$ or US-20060291544-\$ or US-20070015543-\$ or US-20070210960-\$ or US-20070225033-\$ or US-20080285637-\$ or US-20080318524-\$ or US-20090046768-\$ or US-20090161739-\$ or US-20090325515-\$ or US-20100150254-\$ or US-20100171661-\$ or US-20100234071-\$ or US-20110199968-\$ or US-20110228749-\$ or US-20110280341-\$).did. or (US-20120112962-\$).did. or (US-7751494-\$ or US-7769098-\$ or US-7502408-\$ or US-7574236-\$ or US-7619997-\$ or US-7693551-\$ or US-7714780-\$ or US-7738583-\$ or US-7738584-\$ or US-7986650-\$ or US-8040970-\$ or US-8045926-\$ or US-8085871-\$ or US-8120532-\$ or US-8126040-\$ or US-8180285-\$ or US-8184679-\$ or US-7809074-\$ or US-7893871-\$ or US-7917176-\$ or US-7961807-\$).did.	US-PGPUB; USPAT	OR	ON	2012/06/25 15:23
S20	45	((DONALD) near2 (EIDSON)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:29
S21	3	((DONALD) near2 (EIDSON)).INV. and beam\$6	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:30
S22	0	((RONALD) near2 (CHAFFEE)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:32
S23	2989	(antenna adj arrays) with (spacing or distance or wavelength)	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:36
S24	84	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:37
S26	2	"20080240208"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/26 10:22
S27	1	"12913589"	US-PGPUB; USPAT;	OR	ON	2013/01/18 14:53

			USOCR			
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EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	216	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	USPAT; UPAD	OR	ON	2013/09/25 15:02
L2	53	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	USPAT; UPAD	OR	ON	2013/09/25 15:02
L3	14	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT; UPAD	OR	ON	2013/09/25 15:03
L4	128	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same "arrays" and transceiver	USPAT; UPAD	OR	ON	2013/09/25 15:03
L5	14	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT; UPAD	OR	ON	2013/09/25 15:04
L6	128	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array and transceiver	USPAT; UPAD	OR	ON	2013/09/25 15:08
L7	216	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	USPAT; UPAD	OR	ON	2013/09/25 15:08
S25	0	"13447139"	US-PGPUB; USPAT; UPAD	OR	ON	2012/06/25 15:22

9/ 25/ 2013 3:09:29 PM**C:\ Users\ wcadeau\ Documents\ EAST\ Workspaces\ 13447139.wsp**

Issue Classification 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2632

CPC		
Symbol	Type	Version

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

/WEDNEL CADEAU/ Examiner.Art Unit 2632	09/25/2013	Total Claims Allowed: 20	
(Assistant Examiner)	(Date)		
/CHIEH M FAN/ Supervisory Patent Examiner.Art Unit 2632	09/30/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

Issue Classification 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2632

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	13	17												
	2	14	18												
	3	15	19												
2	4	16	20												
3	5	17	21												
4	6	18	22												
5	7	19	23												
6	8	20	24												
7	9														
8	10														
9	11														
10	12														
	13														
	14														
11	15														
12	16														

/WEDNEL CADEAU/ Examiner.Art Unit 2632 (Assistant Examiner)	09/25/2013 (Date)	Total Claims Allowed: 20	
/CHIEH M FAN/ Supervisory Patent Examiner.Art Unit 2632 (Primary Examiner)	09/30/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 3

Search Notes 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2611

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375	267, 211, 146, 347	6/25/2012	WC
455	277.1, 63.4, 63.1	6/25/2012	WC

SEARCH NOTES		
Search Notes	Date	Examiner
Plus Search	6/25/2012	WC
Inventor Search	6/25/2012	WC
IEEE Search (update search 12/05/2012)	6/25/2012	WC
Google Search (update search 12/05/2012)	6/25/2012	WC
NPL Search	6/25/2012	WC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
375	Text Search	9/25/2013	WC

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

64046 7590 10/08/2013
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

EXAMINER

CADEAU, WEDNEL

ART UNIT

PAPER NUMBER

2632

DATE MAILED: 10/08/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764

TITLE OF INVENTION: DIRECTED MIMO COMMUNICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$0	\$0	\$890	01/08/2014

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

64046 7590 10/08/2013
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764

TITLE OF INVENTION: DIRECTED MIMO COMMUNICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$0	\$0	\$890	01/08/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
CADEAU, WEDNEL	2632	375-267000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

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

2. For printing on the patent front page, list

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

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

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

(A) NAME OF ASSIGNEE

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

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

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

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

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764
64046	7590	10/08/2013	EXAMINER	
Mintz Levin/San Diego Office			CADEAU, WEDNEL	
One Financial Center			ART UNIT	
Boston, MA 02111			PAPER NUMBER	

2632

DATE MAILED: 10/08/2013

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

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

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

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

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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.
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**Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and
December 31, 2013**

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to \$0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

Notice of Allowability	Application No. 13/447,139	Applicant(s) EIDSON ET AL.	
	Examiner WEDNEL CADEAU	Art Unit 2632	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to supplemental amendment filed on 09/24/2013.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 1,4-12 and 15-24. 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)	5. ☒ Examiner's Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material	7. ☐ Other _____.
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/WEDNEL CADEAU/ Examiner, Art Unit 2632	
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1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David C. Laney on 09/30/2013.

1. (Currently Amended) A system comprising:
 - m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and
 - a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
 - n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:
 - a MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and

a MIMO transmitter configured to process m different transmit signals, wherein a v -th transmit signal from a z -th MIMO transmitter corresponds to a z -th beam of a v -th antenna array,

wherein m , n , v , and z are integer number values,

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, ~~and~~

wherein $n \geq 2$ and $m \geq 2$, ~~and~~

wherein $z = 1, \dots, w$, and

wherein $n \geq w \geq 2$. ~~Equal one or more values between 2 and n .~~

2. (Cancelled)
3. (Cancelled)
4. (Original) The system of claim 1, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11 a/b/g/n /ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.
5. (Original) The system of claim 1, wherein $m=3$ and $n=6$.

6. (Original) The system of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

7. (Original) The system of claim 1, wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency.

8. (Original) The system of claim 1, wherein the beamformer is an electronic beamformer.

9. (Original) The system of claim 1, wherein the antenna array further comprises a lens.

10. (Original) The system of claim 9, wherein the lens is a Honda or Rotman lens.

11. (Previously Presented) The system of claim 1, wherein the system simultaneously provides MIMO and beamforming.

12. (Currently Amended) An apparatus comprising:

 m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to process m different received signals, wherein an i -th received signal to a j -th MIMO receiver corresponds to a j -th beam of an i -th antenna array; and

a MIMO transmitter configured to process m different transmit signals,

wherein a v -th transmit signal from a z -th MIMO transmitter corresponds to a z -th beam of a v -th antenna array,

wherein m , n , v , and z are integer number values, and

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, ~~and~~

wherein $n \geq 2$ and $m \geq 2$ ~~and~~

wherein $z = 1, \dots, w$, ~~and~~

wherein $n \geq w \geq 2$. ~~Equal one or more values between 2 and n .~~

13. (Cancelled)

14. (Cancelled)

15. (Original) The apparatus of claim 12, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

16. (Original) The apparatus of claim 12, wherein $m=3$ and $n=6$.

17. (Previously Presented) The apparatus of claim 12, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

18. (Original) The apparatus of claim 12, wherein the antenna elements are less than one half wavelength apart at the carrier frequency.

19. (Original) The apparatus of claim 12, wherein the beamformer is an electronic beamformer.

20. (Original) The apparatus of claim 12, wherein the antenna array further comprises a lens.

21. (Original) The apparatus of claim 12, wherein the lens is a Honda or Rotman lens.

22. (Previously Presented) The apparatus of claim 12, wherein the apparatus simultaneously provides MIMO and beamforming.

23. (Previously Presented) An apparatus comprising:

- m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and
 - a beamformer configured to produce n different receive beams using the plurality of antenna elements; and
- n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array,

wherein m and n are integer number values, and

wherein $i=1, \dots, m$, and $j=1, \dots, n$, and

wherein $n \geq 2$ and $m \geq 2$.

24. (Currently Amended) An apparatus comprising:

- m antenna arrays configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and

a beamformer configured to produce n different transmit beams using the plurality of antenna elements; and

n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to process m different transmit signals, wherein a v -th transmit signal from a z -th MIMO transmitter corresponding to a z -th beam of a v -th antenna array is selected for transmission,

wherein m , n , v , and z are integer number values, and

wherein $z=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

Prior arts:

1. Adams et al. (US 20090322608 A1, hereinafter "Adams")
2. Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna")

Adams teaches a system comprising:

a plurality of m antennas arrays configured to receive a propagating radio frequency signal (*Adams [0004], figs. 3, 5, where Adams gives an overview of the system in relation to prior arts and that such systems usually composed of arrays of antenna elements*), each of the antenna arrays comprising:

a plurality of antenna elements (*Adams [0004], where Adams discloses arrays that are composed of a plurality of antenna elements*); and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements (*Adams [0070], where Adams discloses a beam former (8) that produce several bi-directional beams*); and

a plurality of n multiple-input multiple-output transceivers (MIMO) comprising (*Adams [0004], [0040]-[0041], [0050], [0057], figs. 3, 5-8, 16, and 17, where Adams discloses a several MIMO transceivers*), each MIMO transceiver;

a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array (*Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, although Adams only shows one antenna array, he discloses that the signals received at individual antenna element (7a) are connected to a respective individual element output of the inverse beamformer 25a, therefore it would have been obvious to one with ordinary skill in the art to recognize that if more than one arrays were illustrated all the elements (7a) from each array would end up combined together to form (25a) and so on.. and associate (25a) to a particular MIMO transceiver like in figs. 8 and 17*);

a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission, wherein m , n , v , and z are integer number values, and wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$ (*Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, since Adams system is a transceiver it is safe to say that the same principle would apply on the reverse link*).

Wherein $z = 1, \dots, w$, and wherein $n \geq w \geq 2$ (*Adams fig. 6*).

Although implicitly one can see that the system of Adams performs both transmission and reception via antennal elements 7a-7d, however, in order to be more explicit one can rely on

the teaching of Rudrapatna. Rudrapatna discloses a plurality of arrays of antenna elements in a beamforming MIMO where antenna elements and/or arrays of antennas are selected to perform transmission or reception as necessary (*Rudrapatna [0017]-[0019], figs 1 and 2*).

However, the combination above fails to teach "a beam configured to produce n different bi-directional beams using the plurality of antenna elements: and n multiple input multiple-output transceivers" and it would not have been obvious to one having ordinary skill in the art. Therefore, the office found the claimed invention to be allowable over the cited prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WEDNEL CADEAU whose telephone number is (571)270-7843. The examiner can normally be reached on M-TH 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WEDNEL CADEAU/
Examiner, Art Unit 2632
September 25, 2013

/CHIEH M FAN/

Supervisory Patent Examiner, Art Unit 2632

Notice of References Cited	Application/Control No. 13/447,139		Applicant(s)/Patent Under Reexamination EIDSON ET AL.	
	Examiner WEDNEL CADEAU		Art Unit 2632	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2009/0322608	12-2009	Adams et al.	342/368
*	B	US-2002/0132600	09-2002	Rudrapatna, Ashok N.	455/277.1
*	C	US-2008/0240208	10-2008	Lou et al.	375/211
*	D	US-2005/0156801	07-2005	Honda, Royden M.	343/754
	E	US-			
	F	US-			
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	I	US-			
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FOREIGN PATENT DOCUMENTS

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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US

CONFIRMATION NO. 4764

64046
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

PUBLICATION NOTICE



OC000000064437897

Title:DIRECTED MIMO COMMUNICATIONS

Publication No.US-2013-0272437-A1

Publication Date:10/17/2013

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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Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

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

Application Number	13447139	Filing Date	2012-04-13	Docket Number (if applicable)	43273-513F01US	Art Unit	2632
First Named Inventor	Donald Brian Eidson			Examiner Name	W. Cadeau		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
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Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

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

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

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☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

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MISCELLANEOUS

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

☐ Other _____

FEES

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 The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to
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☒ Patent Practitioner Signature

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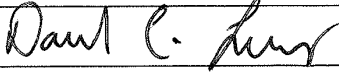
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

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Signature of Registered U.S. Patent Practitioner			
Signature		Date (YYYY-MM-DD)	2014-01-07
Name	David C. Laney, Ph.D.	Registration Number	66859

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

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

Electronic Patent Application Fee Transmittal				
Application Number:		13447139		
Filing Date:		13-Apr-2012		
Title of Invention:		DIRECTED MIMO COMMUNICATIONS		
First Named Inventor/Applicant Name:		Donald Brian Eidson		
Filer:		David C. Laney		
Attorney Docket Number:		43273-513F01US		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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

Electronic Acknowledgement Receipt	
EFS ID:	17841094
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	David C. Laney
Filer Authorized By:	
Attorney Docket Number:	43273-513F01US
Receipt Date:	07-JAN-2014
Filing Date:	13-APR-2012
Time Stamp:	16:04:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$850
RAM confirmation Number	2710
Deposit Account	500311
Authorized User	LANEY, DAVID
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		43273-513F01US_IDS.pdf	149162	yes	3
			de7c03ea403c0cd60a80e17a7c151a191c7443f5		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	3	
Warnings:					
Information:					
2	Non Patent Literature	REF_ZTE.pdf	217412	no	4
			4e4524dabb1bfc41795e3a92e855175a4d301de9		
Warnings:					
Information:					
3	Non Patent Literature	REF_Alamouti1998.pdf	770545	no	8
			4c1152c5a729e2f8e72d297a7a1044147e0b8e54		
Warnings:					
Information:					
4	Non Patent Literature	REF_Foschini.pdf	702676	no	19
			0efec148a47d813aa165080f30116d30bc253762		
Warnings:					
Information:					
5	Non Patent Literature	REF_Tarokh.pdf	986120	no	22
			c50b0d69093436bb465406368756424a33c07620		
Warnings:					
Information:					
6	Non Patent Literature	REF_Weerackody1993.pdf	469811	no	5
			7e5684399e808dd42f34d72d8995d35457d67e70		
Warnings:					
Information:					
7	Non Patent Literature	REF_Wittneben.pdf	332371	no	6
			b948437b540b2b032f436dca9448fa3592caf538		
Warnings:					
Information:					

8	Request for Continued Examination (RCE)	43273_513F01US_RCE.pdf	172612 3746dd1f55013b1057bc4240827ff275d4ee0479	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	29933 d6a9df8ceedfd87db223c7e9f6643980131929e7	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			3830642		
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.					

Via EFS
Date of Deposit: January 7, 2014

Docket No.: 43273-513F01US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Donald Brian Eidson et al.

Application No.: 13/447,139

Confirmation No.: 4764

Filed: April 13, 2012

Art Unit: 2632

For: Directed MIMO Communications

Examiner: W. Cadeau

INFORMATION DISCLOSURE STATEMENT (IDS)

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

Dear Madam:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement, pursuant to 37 C.F.R. § 1.114(c), accompanies the Request for Continued Examination (37 C.F.R. § 1.114) submitted herewith.

The undersigned submits herewith copies of the non-patent literature documents in accordance with 37 C.F.R. § 1.98(a)(2).

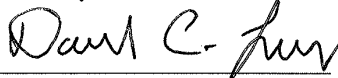
In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0311, under Order No. 43273-513F01US.

Dated: January 7, 2014

Respectfully submitted,

By 

David C. Laney, Ph.D.

Registration No.: 66,859

MINTZ LEVIN COHN FERRIS GLOVSKY

AND POPEO, P.C.

3580 Carmel Mountain Road

Suite 300

San Diego, California 92130-6768

(858) 314-1500

(858) 314-1501 (Fax)

Agent for Applicant

Substitute for form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	13/447,139
				Filing Date	April 13, 2012
				First Named Inventor	Donald Brian Eidson
				Art Unit	2632
				Examiner Name	W. Cadeau
Sheet	1	of	1	Attorney Docket Number	43273-513F01US

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number Number-Kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		None			

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		None				

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

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	A	"Combination of MIMO and Beamforming technology for WIMAX." ZTE. ZTE. 19 Nov. 2011. WayBack Machine. Web. 6 Jan. 2014.	
	B	Alamouti, S.M. "A Simple Transmit Diversity Technique for Wireless Communications." <i>IEEE J. Sel. Areas Commun.</i> 16 (8). Oct. 1998: pp. 1451-1458.	
	C	Foschini, G. J. "Layered Space-Time Architecture for Wireless Communication in a Fading Environment When Using Multi-Element Antennas." <i>Bell Labs Syst. Tech. J.</i> Vol. 1., Autumn 1996: pp. 41-59.	
	D	Tarokh, V., et al. "Space-Time Codes for High Data Rate Wireless Communication: Performance Criterion and Code Construction." <i>IEEE Trans. Inf. Theory.</i> 44 (2). Mar. 1998: pp. 744-765.	
	E	Weerackody, V. "Diversity for the Direct-Sequence Spread Spectrum System Using Multiple Transmit Antennas." <i>Proc. IEEE Int. Communications Conf.</i> 3. Geneva. 23-26 May 1993: pp. 1775-1779.	
	F	Wittneben, A. "Basestation Modulation Diversity for Digital SIMULCAST." <i>Proc. IEEE Vehicular Technology Conf.</i> St. Louis, Mo., 19-22 May 1991: pp. 848-853.	
Examiner Signature		Date Considered	

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

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



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

64046 7590 01/16/2014
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

EXAMINER

CADEAU, WEDNEL

ART UNIT

PAPER NUMBER

2632

DATE MAILED: 01/16/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764

TITLE OF INVENTION: DIRECTED MIMO COMMUNICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	04/16/2014

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

64046 7590 01/16/2014
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764

TITLE OF INVENTION: DIRECTED MIMO COMMUNICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	04/16/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
CADEAU, WEDNEL	2632	375-267000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

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

2. For printing on the patent front page, list

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

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

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

(A) NAME OF ASSIGNEE

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

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

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

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

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ 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. _____



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764
64046	7590	01/16/2014	EXAMINER	
Mintz Levin/San Diego Office			CADEAU, WEDNEL	
One Financial Center			ART UNIT	
Boston, MA 02111			PAPER NUMBER	

2632

DATE MAILED: 01/16/2014

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

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

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

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

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

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 13/447,139	Applicant(s) EIDSON ET AL.	
	Examiner WEDNEL CADEAU	Art Unit 2632	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to RCE filed on 01/07/2014.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 1,4-12 and 15-24. 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)	5. ☒ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material	7. ☐ Other _____
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____	

/WEDNEL CADEAU/ Examiner, Art Unit 2632	
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DETAILED ACTION

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

This office action is in response to a request for continued examination (RCE) filed by the applicant on 01/07/2014.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David C. Laney on 09/30/2013.

1. (Currently Amended) A system comprising:

m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to process m different received signals, wherein an i -th received signal to a j -th MIMO receiver corresponds to a j -th beam of an i -th antenna array; and

a MIMO transmitter configured to process m different transmit signals, wherein a v -th transmit signal from a z -th MIMO transmitter corresponds to a z -th beam of a v -th antenna array,

wherein m , n , v , and z are integer number values,

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, ~~and~~

wherein $n \geq 2$ and $m \geq 2$, ~~and~~

wherein $z = 1, \dots, w$, and

wherein $n \geq w \geq 2$. Equal one or more values between 2 and n .

2. (Cancelled)

3. (Cancelled)

4. (Original) The system of claim 1, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n /ac(WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

5. (Original) The system of claim 1, wherein $m=3$ and $n=6$.
6. (Original) The system of claim 1, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.
7. (Original) The system of claim 1, wherein the antenna elements are less than or equal to one half wavelength apart at the carrier frequency.
8. (Original) The system of claim 1, wherein the beamformer is an electronic beamformer.
9. (Original) The system of claim 1, wherein the antenna array further comprises a lens.
10. (Original) The system of claim 9, wherein the lens is a Honda or Rotman lens.
11. (Previously Presented) The system of claim 1, wherein the system simultaneously provides MIMO and beamforming.
12. (Currently Amended) An apparatus comprising:

m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and

a MIMO transmitter configured to process m different transmit signals,

wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a z-th beam of a v-th antenna array,

wherein m, n, v, and z are integer number values, and

wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$ and

wherein $z = 1, \dots, w$, and

wherein $n \geq w \geq 2$. Equal one or more values between 2 and n.

13. (Cancelled)

14. (Cancelled)

15. (Original) The apparatus of claim 12, configured to substantially comply with one or more of Electrical and Electronic Engineers (IEEE) 802.11a/b/g/n/ac (WiFi), IEEE 802.16 (WiMAX), 2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD, High Speed Packet Access (HSPA), and HSPA+.

16. (Original) The apparatus of claim 12, wherein $m=3$ and $n=6$.

17. (Previously Presented) The apparatus of claim 12, wherein the m antenna arrays are separated by a distance more than one wavelength apart at the carrier frequency.

18. (Original) The apparatus of claim 12, wherein the antenna elements are less than one half wavelength apart at the carrier frequency.

19. (Original) The apparatus of claim 12, wherein the beamformer is an electronic beamformer.

20. (Original) The apparatus of claim 12, wherein the antenna array further comprises a lens.

21. (Original) The apparatus of claim 12, wherein the lens is a Honda or Rotman lens.

22. (Previously Presented) The apparatus of claim 12, wherein the apparatus simultaneously provides MIMO and beamforming.

23. (Previously Presented) An apparatus comprising:

- m antenna arrays configured to receive a propagating radio frequency signal, each of the antenna arrays comprising:
 - a plurality of antenna elements; and
 - a beamformer configured to produce n different receive beams using the plurality of antenna elements; and
- n multiple-input multiple-output receivers (MIMO), each MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array,
- wherein m and n are integer number values, and
- wherein $i=1, \dots, m$, and $j=1, \dots, n$, and
- wherein $n \geq 2$ and $m \geq 2$.

24. (Currently Amended) An apparatus comprising:

m antenna arrays configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different transmit beams using the plurality of antenna elements; and

n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponding to a z-th beam of a v-th antenna array is selected for transmission,

wherein m, n, v, and z are integer number values, and

wherein $z=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.

Prior arts:

1. Adams et al. (US 20090322608 A1, hereinafter "Adams")
2. Rudrapatna (US 20020132600 A1, hereinafter "Rudrapatna")

Adams teaches a system comprising:

a plurality of m antennas arrays configured to receive a propagating radio frequency signal (*Adams [0004], figs. 3, 5, where Adams gives an overview of the system in*

relation to prior arts and that such systems usually composed of arrays of antenna elements),
each of the antenna arrays comprising:

a plurality of antenna elements (*Adams [0004], where Adams discloses arrays that are composed of a plurality of antenna elements*); and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements (*Adams [0070], where Adams discloses a beam former (8) that produce several bi-directional beams*); and

a plurality of n multiple-input multiple-output transceivers (MIMO) comprising (*Adams [0004], [0040]-[0041], [0050], [0057], figs. 3, 5-8, 16, and 17, where Adams discloses a several MIMO transceivers*), each MIMO transceiver;

a MIMO receiver configured to accept m received signals, wherein the i-th input signal to the j-th MIMO receiver corresponds to the j-th beam of the i-th antenna array (*Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, although Adams only shows one antenna array, he discloses that the signals received at individual antenna element (7a) are connected to a respective individual element output of the inverse beamformer 25a, therefore it would have been obvious to one with ordinary skill in the art to recognize that if more than one arrays were illustrated all the elements (7a) from each array would end up combined together to form (25a) and so on.. and associate (25a) to a particular MIMO transceiver like in figs. 8 and 17*);

a MIMO transmitter configured to provide m transmit signals, wherein the v-th output signal from the z-th MIMO transmitter corresponding to the z-th beam of the v-th antenna array is selected for transmission, wherein m, n, v, and z are integer number values, and wherein $i=1$,

..., m, j=1, ..., n, and v=1, ...m (*Adams [0008], [0060], [0061], figs. 5, 8, 14, 15, 17, since Adams system is a transceiver it is safe to say that the same principle would apply on the reverse link*).

Wherein $z = 1, \dots, w$, and wherein $n \geq w \geq 2$ (*Adams fig. 6*).

Although implicitly one can see that the system of Adams performs both transmission and reception via antennal elements 7a-7d, however, in order to be more explicit one can rely on the teaching of Rudrapatna. Rudrapatna discloses a plurality of arrays of antenna elements in a beamforming MIMO where antenna elements and/or arrays of antennas are selected to perform transmission or reception as necessary (*Rudrapatna [0017]-[0019], figs 1 and 2*).

However, the combination above fails to teach "a beam configured to produce n different bi-directional beams using the plurality of antenna elements: and n multiple input multiple-output transceivers" and it would not have been obvious to one having ordinary skill in the art. Therefore, the office found the claimed invention to be allowable over the cited prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WEDNEL CADEAU whose telephone number is (571)270-7843. The examiner can normally be reached on M-TH 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WEDNEL CADEAU/
Examiner, Art Unit 2632
January 9, 2014

/CHIEH M FAN/

Supervisory Patent Examiner, Art Unit 2632

Notice of References Cited	Application/Control No. 13/447,139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.	
	Examiner WEDNEL CADEAU	Art Unit 2632	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2009/0322608	12-2009	Adams et al.	342/368
*	B	US-2002/0132600	09-2002	Rudrapatna, Ashok N.	455/277.1
*	C	US-2008/0240208	10-2008	Lou et al.	375/211
*	D	US-2005/0156801	07-2005	Honda, Royden M.	343/754
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

Search Notes 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2611

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
375455	267, 211, 146, 347277.1, 63.4, 63.1	6/25/20126/25/2012	WCWC

SEARCH NOTES			
Search Notes		Date	Examiner
Plus SearchInventor SearchIEEE Search (update search 12/05/2012)Google Search (update search 12/05/2012)NPL Search		6/25/20126/25/20126/25/20126/25/2012	WCWCWCWCWC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
375	Text Search	9/25/2013	WC

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Issue Classification 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2632

CPC		
Symbol	Type	Version

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

/WEDNEL CADEAU/ Examiner.Art Unit 2632 (Assistant Examiner)	01/09/2014 (Date)	Total Claims Allowed: 20	
/CHIEH M FAN/ Supervisory Patent Examiner.Art Unit 2632 (Primary Examiner)	01/10/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 3

Issue Classification 	Application/Control No. 13447139	Applicant(s)/Patent Under Reexamination EIDSON ET AL.
	Examiner WEDNEL CADEAU	Art Unit 2632

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	13	17												
	2	14	18												
	3	15	19												
2	4	16	20												
3	5	17	21												
4	6	18	22												
5	7	19	23												
6	8	20	24												
7	9														
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9	11														
10	12														
	13														
	14														
11	15														
12	16														

/WEDNEL CADEAU/ Examiner.Art Unit 2632 (Assistant Examiner)	01/09/2014 (Date)	Total Claims Allowed: 20	
/CHIEH M FAN/ Supervisory Patent Examiner.Art Unit 2632 (Primary Examiner)	01/10/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 3

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"13447139"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/09 09:44
L4	22	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/01/09 09:50
S1	0	"13447139"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:03
S2	486	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:10
S3	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S4	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S5	0	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array same (bi adj2 direction\$4) and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:11
S6	1	"6980169"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 08:31
S7	4	("20040174299" "20040223476" "20040224637" "20050075070").PN. OR ("6980169").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 09:38
S8	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same arrays and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S9	281	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same "arrays" and transceiver	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 10:33
S10	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S11	0	("2009/0322608").URPN.	USPAT	OR	ON	2012/06/25 10:39
S12	0	(synthesiz\$4 near beam) and (antenna adj	USPAT	OR	ON	2012/06/25

		array) and (beam adj former) and (signal near condition\$4)				12:00
S13	13	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT	OR	ON	2012/06/25 12:02
S14	0	"20090103593"	USPAT	OR	ON	2012/06/25 12:29
S15	2	"20090103593"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 12:29
S16	0	"10760023"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:00
S17	1	"20050156801"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 14:01
S18	0	"13447139"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/06/25 15:21
S19	48	(US-20060264184-\$ or US-20080304463-\$ or US-20080304464-\$ or US-20090203405-\$ or US-20100304666-\$ or US-20120046003-\$ or US-20060239366-\$ or US-20060239372-\$ or US-20060239373-\$ or US-20060239374-\$ or US-20060239375-\$ or US-20060291544-\$ or US-20070015543-\$ or US-20070210960-\$ or US-20070225033-\$ or US-20080285637-\$ or US-20080318524-\$ or US-20090046768-\$ or US-20090161739-\$ or US-20090325515-\$ or US-20100150254-\$ or US-20100171661-\$ or US-20100234071-\$ or US-20110199968-\$ or US-20110228749-\$ or US-20110280341-\$).did. or (US-20120112962-\$).did. or (US-7751494-\$ or US-7769098-\$ or US-7502408-\$ or US-7574236-\$ or US-7619997-\$ or US-7693551-\$ or US-7714780-\$ or US-7738583-\$ or US-7738584-\$ or US-7986650-\$ or US-8040970-\$ or US-8045926-\$ or US-8085871-\$ or US-8120532-\$ or US-8126040-\$ or US-8180285-\$ or US-8184679-\$ or US-7809074-\$ or US-7893871-\$ or US-7917176-\$ or US-7961807-\$).did.	US-PGPUB; USPAT	OR	ON	2012/06/25 15:23
S20	45	((DONALD) near2 (EI DSON)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:29
S21	3	((DONALD) near2 (EI DSON)).INV. and beam\$6	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 16:30
S22	0	((RONALD) near2 (CHAFFEE)).INV.	US-PGPUB;	OR	ON	2012/06/25

			USPAT; USOCR			16:32
S23	2989	(antenna adj arrays) with (spacing or distance or wavelength)	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:36
S24	84	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/25 17:37
S26	2	"20080240208"	US-PGPUB; USPAT; USOCR	OR	ON	2012/06/26 10:22
S27	1	"12913589"	US-PGPUB; USPAT; USOCR	OR	ON	2013/01/18 14:53

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	2	((DONALD) near2 (EIDSON)).INV. and beam\$6	USPAT; UPAD	OR	ON	2014/01/09 09:47
L3	53	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	USPAT; UPAD	OR	ON	2014/01/09 09:47
S25	0	"13447139"	US-PGPUB; USPAT; UPAD	OR	ON	2012/06/25 15:22
S28	216	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	USPAT; UPAD	OR	ON	2013/09/25 15:02
S29	53	(antenna adj arrays) with (spacing or distance or wavelength)with lambda	USPAT; UPAD	OR	ON	2013/09/25 15:02
S30	14	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT; UPAD	OR	ON	2013/09/25 15:03
S31	128	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same "arrays" and transceiver	USPAT; UPAD	OR	ON	2013/09/25 15:03
S32	14	(synthesiz\$4 near beam) and (antenna adj array) and (beam adj former)	USPAT; UPAD	OR	ON	2013/09/25 15:04
S33	128	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array and transceiver	USPAT; UPAD	OR	ON	2013/09/25 15:08
S34	216	(beamform\$4 or (beam adj2 (former or forming))) same MIMO same antenna same array	USPAT; UPAD	OR	ON	2013/09/25 15:08

1/9/2014 9:53:14 AM**C:\Users\wcadeau\Documents\EAST\Workspaces\13447139.wsp**

Receipt date: 01/07/2014

13447139 - GAU: 2632

Used in Lieu of PTO/SB/08A/B
(Based on PTO 11-07 version)

Substitute for form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Complete if Known	
				Application Number	13/447,139
				Filing Date	April 13, 2012
				First Named Inventor	Donald Brian Eidson
				Art Unit	2632
				Examiner Name	W. Cadeau
Sheet	1	of	1	Attorney Docket Number	43273-513F01US

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
		None			

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)				
		None				

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

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

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	A	"Combination of MIMO and Beamforming technology for WIMAX." ZTE. ZTE. 19 Nov. 2011. WayBack Machine. Web. 6 Jan. 2014.	
	B	Alamouti, S.M. "A Simple Transmit Diversity Technique for Wireless Communications." <i>IEEE J. Sel. Areas Commun.</i> 16 (8). Oct. 1998: pp. 1451-1458.	
	C	Foschini, G. J. "Layered Space-Time Architecture for Wireless Communication in a Fading Environment When Using Multi-Element Antennas." <i>Bell Labs Syst. Tech. J.</i> Vol. 1., Autumn 1996: pp. 41-59.	
	D	Tarokh, V., et al. "Space-Time Codes for High Data Rate Wireless Communication: Performance Criterion and Code Construction." <i>IEEE Trans. Inf. Theory.</i> 44 (2). Mar. 1998: pp. 744-765.	
	E	Weerackody, V. "Diversity for the Direct-Sequence Spread Spectrum System Using Multiple Transmit Antennas." <i>Proc. IEEE Int. Communications Conf.</i> 3. Geneva. 23-26 May 1993: pp. 1775-1779.	
	F	Wittneben, A. "Basestation Modulation Diversity for Digital SIMULCAST." <i>Proc. IEEE Vehicular Technology Conf.</i> St. Louis, Mo., 19-22 May 1991: pp. 848-853.	
Examiner Signature	/Wednel Cadeau/		Date Considered 01/09/2014

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

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

26147313

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.C./

PART B - FEE(S) TRANSMITTAL

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

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

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

MINTZ LEVIN COHN FERRIS GLOVSKY AND POPEO, P.C.
3580 Carmel Mountain Road
Suite 300
San Diego, California 92130-6768

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US	4764

TITLE OF INVENTION: DIRECTED MIMO COMMUNICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480.00			\$486.00	04/16/2014
EXAMINER	ART UNIT	CLASS-SUBCLASS				
W. Cadeau	2632	375-267000				

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.	2. For printing on the patent front page, list (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.	Mintz Levin Cohn Ferris Glovsky and Popeo, P.C. 1 _____ 2 _____ 3 _____
--	--	---

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

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

(A) NAME OF ASSIGNEE

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

XR COMMUNICATIONS, LLC

SOLANA BEACH, CALIFORNIA

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

4a. The following fee(s) are submitted: ☒ Issue Fee ☐ Publication Fee (No small entity discount permitted) ☒ Advance Order - # of Copies <u>2</u>	4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above) ☐ A check is enclosed. ☒ Payment by credit card. ~~Form PTO-2038 is attached.~~ ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number <u>50-0311</u> (enclose an extra copy of this form).
--	---

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

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

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

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

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

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

Authorized Signature	<u>/DCL314/</u>	Date	<u>April 15, 2014</u>
Typed or printed name	<u>David C. Laney, Ph.D.</u>	Registration No.	<u>66,859</u>

Electronic Patent Application Fee Transmittal				
Application Number:		13447139		
Filing Date:		13-Apr-2012		
Title of Invention:		DIRECTED MIMO COMMUNICATIONS		
First Named Inventor/Applicant Name:		Donald Brian Eidson		
Filer:		David C. Laney/Seton Carr		
Attorney Docket Number:		43273-513F01US		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	480	480
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Printed Copy of Patent - No Color	8001	2	3	6
Total in USD (\$)				486

Electronic Acknowledgement Receipt	
EFS ID:	18772174
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	David C. Laney/Seton Carr
Filer Authorized By:	David C. Laney
Attorney Docket Number:	43273-513F01US
Receipt Date:	15-APR-2014
Filing Date:	13-APR-2012
Time Stamp:	19:16:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$486
RAM confirmation Number	5469
Deposit Account	500311
Authorized User	LANEY, DAVID
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Post Allowance Communication - Incoming	43273-513F01US_AllowComm ents.pdf	87513	no	1
			c95d1557af3d1fc6e872629074140b86933 4c702		
Warnings:					
Information:					
2	Issue Fee Payment (PTO-85B)	43273-513F01US_IssueFeePym t.pdf	107118	no	1
			face63aac3c6b67e49d5f5620a11f0f60c57f 570		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	31722	no	2
			421fc544bb598d890196f7682f52aeb6e456 4b76		
Warnings:					
Information:					
Total Files Size (in bytes):			226353		
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.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Donald Brian Eidson et al.

Allowed: January 16, 2014

Application No.: 13/447,139

Confirmation No.: 4764

Filed: April 13, 2012

Art Unit: 2632

For: Directed MIMO Communications

Examiner: W. Cadeau

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

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

Dear Madam:

Applicant has received the Examiner's Statement of Reasons for Allowance with the January 16, 2014 Notice of Allowance and Allowability regarding the above-identified application. Entry of the Statement into the record should not be construed as any agreement with or acquiescence in the reasoning stated by the Examiner. Each of the claims stands on its own merits and is patentable because of the combination it recites and not because of the presence or absence of any one particular element.

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

Dated: April 15, 2014

Respectfully submitted,

By /DCL314

David C. Laney, Ph.D.

Registration No.: 66,859

MINTZ LEVIN COHN FERRIS GLOVSKY AND
POPEO, P.C.

3580 Carmel Mountain Road
Suite 300

San Diego, California 92130-6768

(858) 314-1500

(858) 314-1501 (Fax)

Attorney for Applicant



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/447,139	05/27/2014	8737511	43273-513F01US	4764

64046 7590 05/07/2014
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

Donald Brian Eidson, San Diego, CA;
Ronald William Chaffee, San Diego, CA;

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

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/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:

22145

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 or the boxes above to:

☒ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name				
Address				
City	State	Zip		
Country				
Telephone	Email			

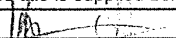
I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

XR Communications, LLC d/b/a Vivato Technologies

- ☐ 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)	1/10/2015
Name	Kai Hansen		
Title	Managing Member		

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 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.

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

Electronic Acknowledgement Receipt	
EFS ID:	32082035
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	Glen L. Nuttall/Mariel Boyan
Filer Authorized By:	Glen L. Nuttall
Attorney Docket Number:	43273-513F01US
Receipt Date:	16-MAR-2018
Filing Date:	13-APR-2012
Time Stamp:	18:46:26
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		1640-013-101-- POAAsFiled03162018.pdf	205245	yes	2
			12384042d65da1b44d71a2ee3ea840316d17686f		

Multipart Description/PDF files in .zip description			
Document Description		Start	End
Transmittal Letter		1	1
Power of Attorney		2	2

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Information:

Total Files Size (in bytes):	205245
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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

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

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

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

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

Application Number	13/447,139		
Filing Date	April 13, 2012		
First Named Inventor	Donald Brian Eidson		
Title	DIRECTED MIMO COMMUNICATIONS		
Art Unit	2632		
Examiner Name	CADEAU, WEDNEL		
Attorney Docket Number	1640-013.101		
SIGNATURE of Applicant or Patent Practitioner			
Signature		Date (Optional)	March 16, 2018
Name	Glen L. Nuttall	Registration Number	46,188
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			
NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.			
☐ *Total of _____ 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.**

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



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US

CONFIRMATION NO. 4764

64046
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

MISCELLANEOUS NOTICE



Date Mailed: 03/21/2018

A communication which cannot be delivered in electronic form has been mailed to the applicant.



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US

CONFIRMATION NO. 4764

64046
 Mintz Levin/San Diego Office
 One Financial Center
 Boston, MA 02111



OC000000098196356

Cc: KLEIN, O'NEILL & SINGH, LLP
 16755 VON KARMAN AVENUE
 SUITE 275
 IRVINE, CA 92606

Date Mailed: 03/21/2018

DENIAL OF REQUEST FOR POWER OF ATTORNEY

The request for Power of Attorney filed 03/16/18 is acknowledged. However, the request cannot be granted at this time for the reason stated below.

- ☐ The Power of Attorney you provided did not comply with the new Power of Attorney rules that became effective on June 25, 2004. See 37 CFR 1.32.
- ☐ The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.
- ☒ The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73(c) has not been received.
- ☐ The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
- ☐ The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
- ☐ The signature(s) of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor(s).
- ☐ The person(s) appointed in the Power of Attorney is not registered to practice before the U.S. Patent and Trademark Office.
- ☐ Only one Customer Number can be designated for the Power of Attorney in an application. The Customer Number that was captured is the first Customer Number provided on the Power of Attorney document.
- ☐ A request under 37 CFR 1.48 to add an inventor was granted in this application, however, no power of attorney consistent with the power of attorney granted by the originally named inventive entity has been



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received. Thus, the addition of the inventor has resulted in the loss of power of attorney in the application. See 37 CFR 1.32(e).

- ☐ The power of attorney has not been accepted because the party who is giving power of attorney has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A patent owner who was not the applicant must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).
- ☐ The power of attorney from the inventors has not been accepted because it is a copy from a prior national application for which benefit is claimed and the continuing application names an inventor who was not named as an inventor in the prior application.
- ☐ The power of attorney from the inventors has not been accepted because the power of attorney must be signed by the applicant for patent. See 37 CFR 1.32(b)(4).
- ☐ Any request to correct or update the name of the applicant must include an application data sheet (ADS) in compliance with 37 CFR 1.76 specifying the correct or updated name of the applicant in the applicant information section. Any request to change the applicant after an original applicant has been specified under 37 CFR 1.46(b) must include a new ADS in compliance with 37 CFR 1.76 specifying the applicant in the applicant information section and comply with 37 CFR 3.71 and 3.73. See 37 CFR 1.46(c).

Any inquiries regarding this notice should be directed to the Application Assistance Unit at 571-272-4200.

A handwritten signature, possibly "SS", written in black ink.

Application Assistance Unit
571-272-4200

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eidson et al.	Art Unit:
Application Serial No.: 13/447,139	Examiner:
Filed: 4/13/2012	
Patent No.: 8,737,511	
Title: DIRECTED MIMO COMMUNICATIONS	

REQUEST FOR CHANGE OF STATUS

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

Dear Sir/Madam:

Applicant respectfully requests a change of status in the above-referenced patent from small entity to large entity.

Respectfully Submitted,
FARJAMI & FARJAMI LLP

/Farshad Farjami/
Farshad Farjami, Esq.
Reg. No. 41,014

FARJAMI & FARJAMI LLP
26522 La Alameda Ave., Suite 360
Mission Viejo, California 92691
Telephone: (949) 282-1000
Facsimile: (949) 282-1002

<u>CERTIFICATE OF ELECTRONIC TRANSMISSION</u>	
I hereby certify that this correspondence is being filed via EFS in United States Patent and Trademark Office, on the date stated below.	
<u>September 20, 2022</u>	
Date	
<u>Evan C. Gunderman</u>	<u>/evan c. gunderman/</u>
Name	Signature

Electronic Acknowledgement Receipt	
EFS ID:	46658300
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	Michael Farjami/Evan Gunderman
Filer Authorized By:	Michael Farjami
Attorney Docket Number:	43273-513F01US
Receipt Date:	20-SEP-2022
Filing Date:	13-APR-2012
Time Stamp:	20:23:51
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	Notification of loss of entitlement to small entity status	0880112_Change_of_Small_Entity_Status_to_Large_Entity_Status.pdf	21651	no	1
			0dbd3c61408d31fb3f26f37f32346a8128af08f6		

Warnings:

Information:	
Total Files Size (in bytes):	21651
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.	

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

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

Application Number	13/447,139
Filing Date	4/13/2012
First Named Inventor	Eidson
Title	DIRECTED MIMO COMMUNICATIONS
Art Unit	2632
Examiner Name	Cadeau, Wednel
Attorney Docket Number	0880112

SIGNATURE of Applicant or Patent Practitioner

Signature	/Farshad Farjami/	Date (Optional)	9/21/2022
Name	Farshad Farjami	Registration Number	41014
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			
NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.			
☐ *Total of _____ 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.

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

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:



Practitioners associated with the Customer Number:

189656

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:



The address associated with Customer Number:

189656

OR

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

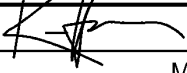
Assignee Name and Address:

XR Communications, LLC
2809 Ocean Front Walk
Venice, California 90291

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	September 9 2022
Name	Mr. Kai Hansen	Telephone	3104259139
Title	Manager, XR Communications, LLC		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt	
EFS ID:	46667188
Application Number:	13447139
International Application Number:	
Confirmation Number:	4764
Title of Invention:	DIRECTED MIMO COMMUNICATIONS
First Named Inventor/Applicant Name:	Donald Brian Eidson
Customer Number:	64046
Filer:	Michael Farjami/Evan Gunderman
Filer Authorized By:	Michael Farjami
Attorney Docket Number:	43273-513F01US
Receipt Date:	21-SEP-2022
Filing Date:	13-APR-2012
Time Stamp:	19:10:58
Application Type:	Utility under 35 USC 111(a)

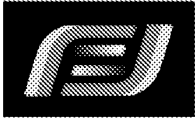
Payment information:

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		0880112_POA_Sept_21_22.pdf	327867	yes	3
			8fe9fd2d6d280fdeba1e0cb884985a0fdc59cf6b		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Transmittal Letter	1	1
	Power of Attorney	2	3
Warnings:			
Information:			
Total Files Size (in bytes):		327867	
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.			



FARJAMI & FARJAMI LLP
AN INTELLECTUAL PROPERTY LAW FIRM

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26522 La Alameda Avenue, Suite 360
Mission Viejo, California 92691
tel: (949) 282-1000
fax: (949) 282-1002

ELECTRONIC TRANSMISSION COVER SHEET

Date: September 21, 2022

To: United States Patent and Trademark Office
Examiner: Cadeau, Wednel; Art Unit: 2632

Re: **Application Serial No.: 13/447,139**
Filing Date: 4/13/2012; First-Named Inventor: Eidson
Attorney Docket No.: 0880112

From: Farjami & Farjami LLP

Number of pages including the cover sheet: 3

Message:

Enclosed, please find:

1. Transmittal for Power of Attorney (Form PTO/AIA/82A); and
2. Power of Attorney Document (Form PTO/SB/80).

Authorization is hereby given to the Commissioner to charge any fees associated with this communication or credit any overpayment to Deposit Account **50-0731**.

Thank you.

The documents accompanying this electronic transmission contain **PRIVILEGED AND CONFIDENTIAL** information intended only for use of the individual or entity named above. If you are not the intended recipient, disclosure, copying, distribution or use of the contents of this electronic transmission information is prohibited. If you have received this electronic transmission in error, please immediately notify us by telephone and return the original electronic transmission to us at the above address via U.S. Postal Service. We will reimburse you for all expenses incurred.



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/447,139	04/13/2012	Donald Brian Eidson	43273-513F01US

64046
Mintz Levin/San Diego Office
One Financial Center
Boston, MA 02111

CONFIRMATION NO. 4764
IMPROPER CPOA LETTER



Date Mailed: 10/07/2022

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 09/21/2022. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney is from an assignee and the statement required by 37 CFR 3.73(c) has not been received.

/zmoguss/

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

189656
XR Communications, LLC
C/O Farjami & Farjami LLP
26522 La Alameda Ave., Suite 360
Mission Viejo, CA 92691
UNITED STATES

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
 filed in the U.S. District Court Eastern District of Texas on the following

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

DOCKET NO. 2:23-cv-00202	DATE FILED 5/8/2023	U.S. DISTRICT COURT Eastern District of Texas
PLAINTIFF XR COMMUNICATIONS, LLC, dba VIVATO TECHNOLOGIES,		DEFENDANT AT&T INC.; AT&T SERVICES INC.; AT&T MOBILITY LLC; AND AT&T CORP.,
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,737,511	5/27/2014	XR Communications, LLC
2 10,715,235	7/14/2020	XR Communications, LLC
3 10,594,376	3/17/2020	XR Communications, LLC
4 7,177,369	2/13/2007	XR Communications, LLC
5 8,289,939	10/16/2012	XR Communications, LLC

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

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

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

DECISION/JUDGEMENT

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

Print

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AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
---	---

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filed in the U.S. District Court Eastern District of Texas on the following

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

DOCKET NO. 2:23-cv-00203	DATE FILED 5/8/2023	U.S. DISTRICT COURT Eastern District of Texas
PLAINTIFF XR COMMUNICATIONS, LLC, dba VIVATO TECHNOLOGIES,		DEFENDANT VERIZON COMMUNICATIONS, INC., CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,737,511	5/27/2014	XR Communications, LLC
2 10,715,235	7/14/2020	XR Communications, LLC
3 10,594,376	3/17/2020	XR Communications, LLC
4 7,177,369	2/13/2007	XR Communications, LLC
5 8,289,939	10/16/2012	XR Communications, LLC

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

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

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DECISION/JUDGEMENT

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

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AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
---	---

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 filed in the U.S. District Court Eastern District of Texas on the following

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

DOCKET NO. 2:23-cv-00204	DATE FILED 5/8/2023	U.S. DISTRICT COURT Eastern District of Texas
PLAINTIFF XR COMMUNICATIONS, LLC, dba VIVATO TECHNOLOGIES,		DEFENDANT T-MOBILE USA, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,737,511	5/27/2014	XR Communications, LLC
2 10,715,235	7/14/2020	XR Communications, LLC
3 10,594,376	3/17/2020	XR Communications, LLC
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DATE INCLUDED	INCLUDED BY	
	☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

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

DECISION/JUDGEMENT		
CLERK	(BY) DEPUTY CLERK	DATE

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

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