PTO/AIA/80 (07-12)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number: 20350

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

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	Country			
	Telephone		Email	

Assignee Name and Address: Dali Wireless, Inc.
535 Middlefield Road, Suite 280
Menlo Park, CA 94025

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	[signature]	Date	06/18/2018
Name	KAM SANDHU	Telephone	
Title	CFO		

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.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on August 9, 2018.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Brian Kanter/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.:
Shawn Patrick Stapleton et al.	Examiner:
Application No.:	Technology Center/Art Unit:
Filed: Herewith	
For: DISTRIBUTED ANTENNA SYSTEM	INFORMATION DISCLOSURE
Customer No.: 20350	STATEMENT

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

Commissioner:

The references cited on attached form PTO/SB/08A are being called to the attention of the Examiner. In accordance with the provisions of 37 CFR §1.98(a)(2), copies of any cited U.S. Patent and U.S. Patent Application Publications are not provided. Copies of the references are not enclosed.

In accordance with 37 CFR §1.98(d), copies of the references can be found in 15/223,819, filed July 29, 2016; 14/800,515, filed July 15, 2015; 14/260,145, filed April 23, 2014; and 13/211,247, filed August 16, 2011.

The following applications are related to this application: 15/223,819; 14/800,515; 14/260,145; and 13/211,247. Copies of any Office Actions in such Patent Applications are available via the USPTO's PAIR or electronic file wrapper system and are believed to be readily accessible to the Examiner. Thus, although Applicant may submit copies of some such Office

Actions, Applicant does not represent that copies of all, or the most significant, Office Actions are being supplied. If the Examiner desires copies of all such Office Actions, the Examiner should contact the undersigned.

It is respectfully requested that the cited references be expressly considered during the prosecution of this application, and the references be made of record therein and appear among the "references cited" on any patent to issue therefrom.

As provided for by 37 CFR §1.97(g) and (h), no inference should be made that the information and references cited are prior art merely because they are in this statement and no representation is being made that a search has been conducted or that this statement encompasses all the possible relevant information.

This Information Disclosure Statement is being filed before the mailing date of the first Office Action on the merits.

Applicant believes that no fee is required for submission of this statement.

Respectfully submitted,

/Kelvin B. Catmull/

Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

Attachment

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

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	Attorney Docket Number	091172-1100459-102450US

	202.	Notification Of Transmittal Of The International Search Report And The Written Opinion Of The International Searching Authority, Or The Declaration and International Search Report and Written Opinion Of The International Searching Authority for International Application No. PCT/US2011/048004 mailed on January 5, 2012, 6 pages.	
	203.	Notification Of Transmittal Of The International Search Report And The Written Opinion Of The International Searching Authority, Or The Declaration and International Search Report and Written Opinion Of The International Searching Authority for International Application No. PCT/US2011/047995 mailed on December 22, 2011, 7 pages.	
	204.	International Search Report and Written Opinion of the International Searching Authority for International Application No. PCT/US2011/047999 mailed on Dec. 19, 2011, 7 pages.	
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	209.	"Common Public Radio Interface (CPRI) Specification V4.0", dated 2008-06-30, downloaded from http://www.cpri.info/spec.html on 03-28-2017, 96 pages.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

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	237.	Notice of Allowance for U.S. Patent Application No. 13/211,247 mailed on March 13, 2013, 11 pages.	
	238.	Non-Final Office Action for U.S. Patent Application No. 13/211,247 mailed on July 22, 2013, 11 pages.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

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	251.	Office Action for Japanese Patent Application No. 2016-139702 mailed, April 20, 2017, 7 pages.	
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	253.	Extended European Search Report for European Application No. 11818697.2 mailed on August 17, 2017, 7 pages.	
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	255.	Partial Supplementary European Search Report for European Application No. 11818695.6 mailed on August 31, 2017, 15 pages.	
	256.	Final Office Action for U.S. Patent Application No. 15/223,819 mailed on September 29, 2017, 21 pages.	
	257.	Office Action for Chinese Patent Application No. 201510531485.1 mailed on November 2, 2017, 6 pages.	
	258.	Notice of Allowance for Korean Patent Application No. 10-2015-7024302, mailed November 10, 2017, 5 pages.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

	259.	Notice of Allowance for U.S. Patent Application No. 15/223,819 mailed on February 1, 2018, 9 pages.	
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	261.	Notice of Allowance for U.S. Patent Application No. 15/223,819 mailed on June 5, 2018, 7 pages.	

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

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

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Kelvin B. Catmull/	Date (YYYY-MM-DD)	2018-08-09
Name/Print	Kelvin B. Catmull	Registration Number	57,535

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

Electronic Acknowledgement Receipt	
EFS ID:	33422650
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull
Filer Authorized By:	
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	09-AUG-2018
Filing Date:	
Time Stamp:	14:17:38
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	Application Data Sheet	102450US_ADS.pdf	1823719 d7a0689cfab8b09dd473986a5efa96613d26c61b	no	10

Warnings:

Information:					
2		102450US_SCA.pdf	173980 e389e5c8d5cec9c1ecaea75019c9a19a2553f168	yes	22
	Multipart Description/PDF files in .zip description				
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	Specification		1	18	
	Appendix to the Specification		19	20	
	Claims		21	21	
	Abstract		22	22	
Warnings:					
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3	Drawings-only black and white line drawings	102450US_Dwgs.pdf	320021 808228e469bac97dabb20f72f43adf816931aa82	no	8
Warnings:					
Information:					
4	Oath or Declaration filed	102450US-Decs.pdf	1140151 c92be8b1e485a0e6bc872320696a238a84a575e1	no	4
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73	102450US_373.pdf	121116 a2f7a65b6f04d43ebde781139db10b13edeee30a	no	3
Warnings:					
Information:					
6	Power of Attorney	DWI_POA_AIA80_06182018.pdf	341211 5495a2ae88e0322e069157a4e1988512f84c6c28	no	1
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	Transmittal Letter	1	2
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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Shawn	Patrick	Stapleton	

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

City	Vancouver	Country of Residence [i]	CA

Mailing Address of Inventor:

Address 1	535 Middlefield Road, Suite 280
Address 2	

City	Menlo Park	State/Province	CA
Postal Code	94025	Country [i]	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul		Lemson	

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

City	Woodinville	State/Province	WA	Country of Residence [i]	US

Mailing Address of Inventor:

Address 1	535 Middlefield Road, Suite 280
Address 2	

City	Menlo Park	State/Province	CA
Postal Code	94025	Country [i]	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bin		Lin	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

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

City	Burnaby	Country of Residence [i]	CA

Mailing Address of Inventor:

Address 1	535 Middlefield Road, Suite 280		
Address 2			
City	Menlo Park	State/Province	CA
Postal Code	94025	Country [i]	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Albert	S.	Lee	

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

City	San Mateo	State/Province	CA	Country of Residence [i]	US

Mailing Address of Inventor:

Address 1	535 Middlefield Road, Suite 280		
Address 2			
City	Menlo Park	State/Province	CA
Postal Code	94025	Country [i]	US

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

Correspondence Information:

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

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

Customer Number	20350		
Email Address	ipefiling@kilpatricktownsend.com	Add Email	Remove Email

Application Information:

Title of the Invention	DISTRIBUTED ANTENNA SYSTEM		
Attorney Docket Number	091172-1100459-102450US	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
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Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	20350		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15223819	2016-07-29

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15223819	Continuation of	14800515	2015-07-15	9419837	2016-08-16
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14800515	Continuation of	14260145	2014-04-23	9137078	2015-09-15
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14260145	Continuation of	13211247	2011-08-16	8737300	2014-05-27
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13211247	Claims benefit of provisional	61439940	2011-02-07		

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

Foreign Priority Information:

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

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

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

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

Authorization or Opt-Out of Authorization to Permit Access:

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

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

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● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
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If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Dali Wireless, Inc.		
Mailing Address Information For Applicant:			
Address 1	535 Middlefield Road, Suite 280		
Address 2			
City	Menlo Park	**State/Province**	CA
Country	US	Postal Code	94025
Phone Number		Fax Number	
Email Address			

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

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Organization Name	Dali Wireless, Inc.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	635 Middlefield Road, Suite 280		
Address 2			
City	Menlo Park	**State/Province**	CA
Country i	US	Postal Code	94025
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Signature	/Kelvin B. Catmull/			Date (YYYY-MM-DD)	2018-08-09
First Name	Kelvin B.	Last Name	Catmull	Registration Number	57535

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	091172-1100459-102450US
	Application Number	
Title of Invention	DISTRIBUTED ANTENNA SYSTEM	

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DISTRIBUTED ANTENNA SYSTEM

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] The present application is a continuation of U.S. Patent Application No. 15/223,819, filed July 29, 2016; which is a continuation of U.S. Patent Application No.14/800,515, filed July 15, 2015, now U.S. Patent 9,419,837; which is a continuation of U.S. Patent Application No. 14/260,145, filed April 23, 2014, now U.S. Patent 9,137,078; which is a continuation of U.S. Patent Application No. 13/211,247, filed August 16, 2011, now U.S. Patent 8,737,300; which claims the benefit of U.S. Provisional Patent Application No. 61/439,940, filed February 7, 2011, the disclosures of which are hereby incorporated by reference for all purposes.

FIELD OF THE INVENTION

[0002] The present invention generally relates to wireless communication systems employing Distributed Antenna Systems (DAS) as part of a distributed wireless network. More specifically, the present invention relates to a DAS utilizing one or more remotely monitored and controlled digital access units configured to assign particular packet transmissions to selected ones of a plurality of remote units, which can in some embodiments be configured in a daisy-chained rings.

BACKGROUND OF THE INVENTION

[0003] Wireless and mobile network operators face the continuing challengeof building networks that effectively manage high data-traffic growth rates. Mobility and an increased level of multimedia content for end users requires end-to-end network adaptations that support both new services and the increased demand for broadband and flat-rate Internet access. One of the most difficult challenges faced by network operators is maximizing the capacity of their DAS networks while ensuring cost-effective DAS deployments and at the same time providing a very high degree of DAS remote unit availability.

[0004] In order to provide DAS network capacity which is high enough to meet short-term needs of network subscribers in specific locations yet also avoid costly and inefficient deployment of radio resources, DAS network planners prefer to employ DAS architectures and solutions which provide a high degree of dynamic flexibility. Therefore, it would be advantageous for wireless network operators to employ a DAS solution which has a high degree of flexibility to implement dynamic rearrangements based on ever-changing network conditions and subscriber needs. Also, the more future-proof a DAS deployment can be, generally the lower its life cycle cost.

[0005] DAS network planners and system integrators employ a wide range of innovative approaches for helping to ensure that a particular DAS deployment is as cost-effective as possible. The types of costs considered by network planners and integrators include DAS deployment or DAS installation cost, as well as operational costs including maintenance costs, emergency restoration costs and network re-arrangement costs. Rearrangement costs are particularly significant for indoor DAS applications, due to frequent changes in building use and facility needs changes. Therefore, it would be advantageous to employ DAS systems and methods which are based on as few DAS transport facilities as possible to minimize installation and/or lease costs and have self-healing capabilities to avoid the need for costly emergency restoration services.

[0006] In order to obtain a high degree of DAS remote unit availability, two primary conditions must be satisfied. First, the DAS remote unit itself must be inherently reliable. Second, the transport media e.g., optical fiber, must be very reliable. It is well known that electronic and/or optical connections themselves are a significant root cause of failure or reduced availability in a DAS network. Companies who maintain outdoor DAS networks have reported that a failure of outside plant optical fiber facilities is not as rare as would be desirable. Therefore, it would be advantageous to employ systems and methods which offer higher redundancy and/or self-healing features in the event of failure of a transport media connection.

SUMMARY OF THE INVENTION

[0007] The present invention substantially achieves the advantages and benefits discussed above and overcomes the limitations of the prior art discussed above by providing a distributed

antenna system responsive to one or more base stations and having at least one but in some embodiments a plurality of Digital Access Units ("DAU's"), each operating to control the packet traffic of an associated plurality of Digital Remote Units ("DRU's"). In embodiments employing multiple DAU's, the DAU's can be daisy-chained linearly or in a ring configuration. Likewise, depending upon the implementation, the DRU's associated with a given DAU can be configured in either a linear or ring Daisy chain configuration.

[0008] The data received from the base stations is down-converted, digitized and converted to baseband with the DAU. The data streams are then I/Q mapped and framed and independently serialized, such that multiple data streams are available in parallel from the DAU. In at least some embodiments, the DAU communicates with the associated DRU's via an optical transport arrangement. It will be appreciated by those skilled in the art that, using the present invention, it is possible to configure a distributed antenna system having n base stations, each providing m RF outputs for transmission by one or more associated DAU's to o DRU's, where the only limits are imposed by the technical performance specifications of the particular DAS, such as delay.

[0009] By the use of a ring configuration for connecting, in at least some embodiments, the DRU's and/or the DAU's, fault tolerance is built into the system, with resulting high availability. In single DAU embodiments, each DRU is accessible through two paths, and therefore remains available even in the event of a line break. In multi-DAU embodiments, where the DAU's are linearly daisy-chained, each DRU is accessible from multiple DRU's such that even some DAU failures will not prevent system operation. In embodiments employing a ring connection for the DAU's, multiple paths exist to each DAU, and thus provide an additional level of fault tolerance as well as dynamic load balancing and resource management as discussed in greater detail hereinafter.

[0010] Thus, the configuration of the advanced system architecture of the present invention provides a high degree of flexibility to manage, control, enhance and facilitate the radio resource efficiency, usage, availability, and overall performance of the distributed wireless network. The present invention enables specialized applications and enhancements including Flexible Simulcast, automatic traffic load-balancing, network and radio resource optimization, network calibration, autonomous/assisted commissioning, carrier pooling, automatic frequency selection, radio frequency carrier placement, traffic monitoring, traffic tagging, and indoor location

determination using pilot beacons. The present invention can also serve multiple operators, multi-mode radios (modulation-independent) and multi-frequency bands per operator to increase the efficiency and traffic capacity of the operators' wireless networks.

[0011] Further the present invention provides a high degree of dynamic flexibility, supports dynamic re-arrangements, and provides a low life cycle cost. This advanced system architecture enables deployment of DAS networks using fewer DAS transport facilities to reduce costs, while providing self-healing features. The present invention also offers redundancy and enhanced system availability.

[0012] It is an object of the present invention to provide Flexible Simulcast capabilities, as disclosed in U.S. Provisional Application S.N. 61/382,836, entitled "Remotely Reconfigurable Distributed Antenna System and Methods," filed September 14, 2010, incorporated herein by reference, in a high-availability ring configuration using, for example, optical fiber transport. As discussed above, the ring configuration insures that a break in any optical fiber cable will not shut down the daisy-chained network, because the downlink and uplink signals can be rerouted around the cable break to the respective DRUs.

[0013] It is a further object of the present invention to balance the bidirectional data rate on the optical fibers so as to increase the maximum achievable data rate during operation on the ring network of DRUs.

[0014] It is a further object of the present invention to provide higher transport network capacity in the event the data transport is asymmetrical between the downlink and uplink, as is typically the case for mobile broadband networks.

[0015] It is a further object of the present invention to provide an adaptive and automatic control for optimizing the transport media capacity on the ring.

[0016] It is a further object of the present invention to provide a method of summing co-channel users' uplink signals in the DRU daisy chain.

[0017] Applications of the present invention are suitable to be employed with distributed base stations, distributed antenna systems, distributed repeaters, mobile equipment and wireless terminals, portable wireless devices, and other wireless communication systems such as

microwave and satellite communications. The present invention is also field upgradable through a link such as an Ethernet connection to a remote computing center.

[0018] Appendix I is a glossary of terms used herein, including acronyms.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Further objects and advantages of the present invention can be more fully understood from the following detailed description taken in conjunction with the accompanying drawings in which:

[0020] Figure 1 is a block diagram according to one embodiment of the invention showing the basic structure and an example of a unidirectional, channelized downlink transport, one ring scenario based on having one DAU and four DRUs.

[0021] Figure 2 is a block diagram in accordance with an embodiment of the invention showing the basic structure and an example of a unidirectional, channelized uplink transport, one ring scenario based on having one DAU and four DRUs.

[0022] Figure 3 is a block diagram in accordance with an embodiment of the invention showing the basic structure and an example of a unidirectional, channelized uplink transport, two ring scenario based on having one DAU and eight DRUs.

[0023] Figure 4 is a block diagram in accordance with an embodiment of the invention showing the basic structure and an example of a unidirectional channelized uplink or downlink transport. This example of a five ring scenario comprises two DAUs and twenty DRUs. Figure 4 provides an example of a daisy chain ring network.

[0024] Figure 5 illustrates an embodiment of a cellular network system employing multiple DRUs according to the present invention.

[0025] Figure 6 illustrates an embodiment of a multi-band system employing six different services operating in different frequency channels with multiple DRUs according to the present invention.

[0026] Figure 7 illustrates in block diagram form the interaction between the DAU embedded software control module and the DRU embedded software control module.

[0027] Figure 8 illustrates in block diagram form an embodiment of a DAS according to an aspect of the invention, including daisy-chained DAU's.

DETAILED DESCRIPTION OF THE INVENTION

[0028] The present invention is a novel Reconfigurable Distributed Antenna System that provides a high degree of flexibility to manage, control, re-configure, enhance and facilitate the radio resource efficiency, usage and overall performance of the distributed wireless network. Figure 1 illustrates an embodiment of the Distributed Antenna System 100 that provides an example of a unidirectional, channelized downlink transport in accordance with the present invention. In Figures 1-4, a dotted line denotes a distinct subset of uplink and downlink channels identified as "A." A dashed line denotes a distinct subset of uplink and downlink channels identified as "B." The subset of uplink and downlink channels in A do not include those of B and *vice versa*. The system employs a Digital Access Unit functionality 105 (hereinafter "DAU"). The DAU 105 serves as an interface between associated base stations (BTS) 110A-B and a plurality of digital remote units (DRU) 125A-n, although only four DRU's are shown in Figure 1. In the present description, "DRU" will be used interchangeably with Remote Radio Head Unit, or "RRU", because of the similarity of the functions discussed herein, although those skilled in the art will recognize that a DRU communicates with a DAU, whereas an RRU communicates with a base station. In addition, those skilled in the art will recognize that a DAU is monitored and controlled by a remote network operations center ("NOC"), as indicated at bidirectional link 115 in Figure 1. Such links are typically Ethernet connections or external modems, but can be any form of link suitable for remote monitoring and control. The NOC has the capability to remotely configure the DAU parameter settings which in turn configures the DRU's parameter settings. The NOC can request information from the DAUs. The DAUs can subsequently request information from the DRUs. The information requested includes but is not limited to uplink power, downlink power, optical error rate, gain settings, active carriers, etc.

[0029] For the downlink (DL) path, RF input signals 120A through 120n are received at the DAU 105 from one or more base station units (BTS) indicated at 110A through 11 Op. The RF input signals are separately down-converted, digitized, and converted to baseband (using a Digital Down-Converter) by the DAU. Data streams are then I/Q mapped and framed and specific parallel data streams are then independently serialized and translated to optical signals

using pluggable SFP modules, again by the DAU 105. The independently serialized, parallel data streams are then delivered to different DRU's 125A-125*k*, typically over optical fiber cable arranged, in at least some embodiments, in a ring configuration indicated at connection pairs 140A-145A, or, in other embodiments, a daisy chain configuration. In addition, each DAU can support a plurality of rings with associated DRU's, where the additional rings are indicated by fiber optic pairs up through 140*o*-145*o*.. It will be appreciated by those skilled in the art that the number of RF inputs, DAU's and DRU's and rings is limited only by network performance factors, such as delay. In addition, as discussed in connection with Figure 4 herein, the DAS can be further extended by using a ring or daisy-chain of DAU's, each of which supports an arrangement of DRU's and rings as shown in Figure 1.

[0030] One function of the DAU 105 is to determine the direction in which downlinked channels are propagated around the ring. As just one example, the embodiment shown in Figure 1 is configured to have downlink channels A, B, C and D propagate in a first direction, for example clockwise, and channels E, F, G, and H propagate in the counter direction, although it will be understood that the number of channels propagating in each direction need not be equal, nor adjacent, nor sequential. Likewise, the number of channels received at each DRU is assigned by the DAU and need not be equal, adjacent or sequential, but instead will typically be any configuration that optimizes network utilization.

[0031] Referring next to Figure 2, an embodiment of an uplink (UL) path in accordance with the invention can be better appreciated. Channels received at the antenna associated with each DRU are converted into optical signals by each DRU 125A-125*k*. Optical signals received from the DRU's are de-serialized and de-framed by the DAU 105, and are also up-converted digitally using a Digital Up-Converter implemented within the DAU 105. Each data stream is then independently converted to the analog domain and up-converted to the appropriate RF frequency band, still within the DAU 105 in the illustrated implementation, although this functionality can be separate. The RF signals are then delivered to the appropriate one of a plurality of BTS' 110A-110*p*. As with the arrangement shown in Figure 1, the direction of propagation of each channel is controlled by the DAU, with some channels propagating in a clockwise direction and others in a counterclockwise direction. Also as discussed in connection with Figure 1, while

adjacent channels are shown as propagating in the same direction in Figure 2, this is not required and any channel can be selected to propagate in either direction.

[0032] Referring again to Figure 1, it will be appreciated by those skilled in the art that, in some implementations of a DAS, more than one carrier can exist in each channel, and, as such, a DRU may receive a channel comprising a signal containing two or more carriers, or a wireless operator may have more than one RF carrier per channel allocated to a single base station. This is referred to as a "composite signal". The manner in which a composite downlink signal is managed by the present invention can be better understood with reference to Figure 1. In such instances, the DAU will receive a composite downlink input signal 130 from, e.g., a first base station 110A belonging to one wireless operator, enters the DAU 105 at the RF input port 120A. Composite signal 130 comprises carriers A-D. A second composite downlink input signal from e.g., a *p*th base station 110p belonging to the same wireless operator enters DAM at the DAU1 RF input port 120*n*. Composite signal 135 comprises carriers E-H. The functionality of the DAU 105, and DRU's 125A-125*k*, respectively, are explained in detail in U.S. Provisional Application S.N. 61/374,593, entitled "Neutral Host Architecture for a Distributed Antenna System," filed August 17, 2010, the disclosure of which is hereby incorporated by reference in its entirety for all purposes.

[0033] One optical output of DAU 105 is fed to DRU 125A, via bidirectional optical cable 140A. A second optical output of DAU 105 is fed via bidirectional optical cable 145A to DRU3. Similarly, bidirectional optical cables 150, 155 and 160 connect DRU's 125A-n in a ring configuration, such that DRU 125A connects to DRU 125B via cable 150A, DRU 125B connects to DRU 125n via cable 15013, and DRU 125k connects to DRU 125C, or the kth-1 DRU, via cable 150m. This connection facilitates networking of DAU 105, which means that all of Carriers A-H are available within DAU 105 to transport data to DRU's 125A-k depending on software settings within the networked DAU system. Depending upon the embodiment, the software settings within DRU 125A are configured either manually or automatically, such that carriers A-H are present in the downlink output signal 155A at the antenna port of DRU 125A. The presence of all eight carriers means that DRU 125A is potentially able to access the full capacity of both base stations feeding DAU 105. A possible application for DRU125A is a

cafeteria in an enterprise building during the lunch hour where a large number of wireless subscribers are gathered.

[0034] DRU 125B is fed by a second optical port of DRU 125A via bidirectional optical cable 150A. The optical cable 150A performs the function of daisy chaining DRU 125A with DRU12513. As with DRU 125A, the software settings within DRU 125B are configured either manually or automatically such that Carriers A, C, D and F are present in downlink output signal 155E at the antenna port of DRU 1258. The capacity of DRU 125B is set to a much lower value than DRU 125A by virtue of its specific channel settings as controlled by DAU 105. The individual Digital Remote Units have integrated frequency selective DUCs and DDCs with gain control for each carrier. The DAU's can remotely turn on and off the individual carriers via the gain control parameters.

[0035] In a similar manner as described previously for DRU 125A, the software settings within DRU 125C are configured either manually or automatically such that Carriers B and F are present in downlink output signal 155C at the antenna port of DRU 125C. Compared to the downlink signal 155B at the antenna port of DRU 12513, the capacity of DRU 125C, which is also configured via its software settings, is much less than the capacity of DRU 125B. DRU 125n is fed by the optical cable 150m connected to the second optical port of the nth-1 DRU, shown for simplicity in Figure 1 as DRU 125C. The software settings within DRU 125n are configured either manually or automatically such that carriers A, D, E and H are present in downlink output signal 155D at the antenna port of DRU 125n. Typically, the capacity of DRU 125n is set to a much lower value than DRU 125A, however, the relative capacity settings of each of DRU's 125A-n can be adjusted dynamically to meet the capacity needs within the coverage zones determined by the physical positions of antennas connected to those DRU's. As noted above, the ring connection is completed by interconnecting DRU 125B and DRU 125n through optical cable 150B. The ring configuration insures that any optical cable breaks will not shut down the daisy chained network. The downlink and uplink signals will be rerouted around the cable break to the respective DRUs.

[0036] The present invention facilitates conversion and transport of several discrete relatively narrow RF bandwidths. This approach allows conversion of only those multiple specific relatively narrow bandwidths which carry useful or specific information. This approach also

allows more efficient use of the available optical fiber transport bandwidth for neutral host applications, and allows transport of more individual operators' band segments over the optical fiber. As disclosed in U.S. Provisional Application S.N. 61/374593, entitled "Neutral Host Architecture for a Distributed Antenna System," filed August 17, 2010 together with U.S. Provisional Application S. N. 61/382,836, entitled "Remotely Reconfigurable Distributed Antenna System and Methods", filed September 14, 2010, both assigned to the assignee of the present invention, and also referring to Figure 1 of the instant patent application, Digital Up Converters located within the DRU can be dynamically reconfigured as the result of commands from the NOC to transport from the DAU input to any specific DRU output any specific narrow frequency band or bands, RF carriers or RF channels which are available at the respective RF input port of either DAU. This capability is illustrated in Figure 1 where only specific frequency bands or RF carriers appear at the output of a given DRU. More specifically, through commands received from the NOC, the FPGA's in the DAU and one or more of the associated DRU's can be reprogrammed or reconfigured to convert and transport only the desired narrow bandwidths.

[0037] A related capability of the present invention is that not only can the Digital Up Converters located within each DRU be configured to transport any specific narrow frequency band from the DAU input to any specific DRU output, but also the Digital Up Converters within each DRU can be configured to transport any specific time slot or time slots of each carrier from the DAU input to any specific DRU output. The carriers and time slots are monitored by the DAU by filtering the signals and performing power detection of the individual time slots, which information can be conveyed to the NOC as desired. Then, as with the Digital Up Converters, the Field Programmable Gate Arrays (FPGA) in the DAU or DRU can be dynamically reconfigured by commands received from the NOC in a manner analogous to software programmability. The DAU detects which carriers and corresponding time slots are active. This information is relayed to the individual DRUs via the management control and monitoring protocol software. This information is then used, as appropriate, by the DRUs for turning off and on individual carriers and their corresponding time slots.

[0038] Data transport between the Base Station and the subscribers is typically asymmetrical, whereby the downlink data rate is higher than the uplink rate. The ring network configuration of

Daisy Chained DRUs can exploit this data rate asymmetry to maximize the data transport on the optical fibers 150A-150m.

[0039] The present invention balances the bidirectional data rate on the optical fibers so as to increase the maximum achievable data rate on the ring network of DRUs. The individual downlink channels are transmitted in a unidirectional sense along the ring network. Referring to Figure 1, downlink channels A, B, C, and D are transmitted in a clockwise sense around the ring of DRU's 125A-*k*. On the other hand, downlink channels E, F, G and H are transmitted in a counterclockwise sense around the ring of DRUs. Referring to Figure 2, the uplink channels J, K, L and M are transmitted in a counterclockwise sense whereas uplink channels N, O, P and Q are transmitted in a clockwise sense around the ring of DRUs. If the downlink and uplink data rates were the same, there would be no advantage in the transport mechanism. However, if the data transport is asymmetrical between the downlink and uplink then a significant advantage can be gained. For example, for a factor of two difference between the downlink and uplink data rates, a 4/3 factor increase in data transport can be achieved. The larger the asymmetry between the downlink and uplink data rates, the larger will be the increase in data transport using the unidirectional channel transport mechanism around the ring.

[0040] Referring again to Figure 1, a further embodiment in accordance with another aspect of the present invention may be better understood. In the event that there is a significant change in asymmetry between the downlink and uplink data rates and/or if there is a change in channel complement at the BTS, the Management Control module [discussed in connection with Figure 7 herein] which is typically comprised within each DAU is able to automatically and adaptively re-allocate data transport resources on the clockwise direction of the ring and on the counter-clockwise direction of the ring to maximize the overall transport capacity. As stated previously, the larger the degree of asymmetry between uplink and downlink data rates for a particular DAU, the higher the increase in data transport using the unidirectional channel transport mechanism around the ring. If there is more than one DAU present, in an embodiment one DAU is designated a Master DAU by the NOC, and the Management Control module located in the Master DAU makes decisions to optimize the overall transport capacity. In the event the master DAU fails, the NOC can designate another DAU as master. Alternatively, any suitable failover algorithm can be implemented.

[0041] Referring to Figure 3, an alternative embodiment of the present invention wherein a single DAU controls a plurality of rings, each comprising a plurality of daisy-chained DRU's, can be better understood. In Figure 3, two daisy-chained rings, indicated at 300 and 305, are shown although the number of rings could be greater and is determined mainly as a matter of design preference up to limits imposed by network performance. The rings each link a plurality of DRU's 310A-*n* and 315A-*m*, to a single DAU 320. The directional flow of the data transport is shown as the dashed lines 325 and dotted lines 330. The downlink channels available from the plurality of DRU's are divided into two subsets which flow in opposite directions around the two daisy-chained rings. The uplink channels are transported in a similar fashion. The channels are grouped into the two subsets so as to maximize the data transport to and from the DRUs. The DAU in turn communicates with one or more BTS's via RF Ports 335A p.

[0042] Heuristic algorithms may be used to allocate RF channel data in a Dual-ring DAS. For Figure 3, there are two fibre rings R1, R2 (clockwise and counter clockwise) and a set T of $n \geq 2$ independent RF channels Ki, $1 \leq i \leq n$ (including uplink and downlink). A channel Ki requires a bandwidth of b(Ki) to transport on a fibre ring. A time-bounded algorithm exists which obtains a schedule having the optimal bandwidth allocation (i.e. the maximum aggregate bandwidth of each ring is as small as possible). A large number of advanced heuristic algorithms have been developed to solve such scheduling optimization problems. Some examples are genetic algorithm, evolutionary algorithm, greedy search, Tabu search, harmony search, simulated annealing, ant colony optimization, etc. For purposes of simplicity and clarity, a simple heuristic algorithm for two rings is described here, although the number of rings is not limited to two.

[0043] The algorithm begins by sorting the channels Ki decreasingly by bandwidth b(Ki). Then it schedules the channel in such a way that each channel is assigned to the ring which has the smaller aggregate bandwidth. The formal description of the algorithm follows.

[0044] Input: T = set of n independent channels Ki with required bandwidth b(Ki), $1 \leq i \leq n$.

[0045] Output: L_1, L_2 and D_1, D_2. Lj is the set of channels schedule on ring Rj, and D_j is the maximum aggregate bandwidth of ring Rj, Dj = $Dj = (\sum b(J), J \varepsilon L_j)$, $1 \leq j \leq 2$.

[0046] ALGORITHM (T, L, D)

[0047] Step 1 (initialize K*i* and D_1, D_2) Sort K*i* such that $b(Ki) \leq b(Ki_{+1})$, $1 \leq i \leq n-1$. $D_1 \leftarrow 0$, $D_2 \leftarrow 0$.

[0048] Step 2 (Schedule a channel)

[0049] For i =1 to n, step 1 do

[0050] If $D_1 \leq D_2$, then [assign K*i* onto L_1, $D_1 \leftarrow D_1 + b(Ki)$].

[0051] else [assign K*i* onto L_2, $D_2 \leftarrow D_2 + b(Ki)$].

[0052] Referring next to Figure 4, a still further an alternative embodiment of the present invention may be understood. The arrangement illustrated in Figure 1 comprised downlink signals from two separate base stations belonging to the same wireless operator entering the DAU 105 at input ports 110A and 110p, respectively. In the embodiment of Figure 4, a first composite signal enters a first DAU 400 at that DAU's RF input port from a base station 405, and a second composite downlink input signal from, e.g., a second base station 410 belonging to a different wireless operator enters DAU 415 at that second DAU's RF input port. DAU 400 directly supports two rings 420 and 425, DAU 415 directly supports two rings 430 and 435, and a ring 440 is shared between DAU 400 and DAU 405. Each of the rings comprises daisy-chained DRU's generally indicated at 445 and connected via, for example, fiber optic links, as discussed in connection with Figure 1. It will be noted that channels A are transported in the opposite sense as channels B. The downlink channels in subset A are transported counterclockwise around each ring, whereas the channels in subset B are transported in a clockwise sense around each ring. In this embodiment, signals belonging to both the first operator and the second operator are converted and transported to the DRU's 445 on ring 440 because DAU 400 and DAU 405 are daisy-chained through the fiber optic cable 440. This embodiment provides an example of a neutral host wireless system, where multiple wireless operators share a common infrastructure comprised of DAU 400, DAU 415, and DRU's 445. All the previously mentioned features and advantages accrue to each of the two wireless operators. It will further be appreciated that, while Figure 4 illustrates only two DAU's linked in daisy-chain style, it is possible to daisy chain a larger plurality of DAU's, and the daisy-chained DAU's can also be configured in a ring configuration similar to the manner in which the DRU's are connected. This arranged is illustrated in Figure 8, below.

[0053] As disclosed in U.S. Provisional Application S.N. 61/374,593, entitled "Neutral Host Architecture for a Distributed Antenna System," filed August 17, 2010 and again referring to Figure 1 of the instant patent application, the Digital Up Converters present in the DRU's of the present invention can be programmed to process various signal formats and modulation types including FDMA, CDMA, TDMA, OFDMA and others. Also, the Digital Up Converters present in the respective DRUs can be programmed to operate with signals to be transmitted within various frequency bands subject to the capabilities and limitations of the system architecture disclosed in U.S. Provisional Application S.N. 61/374593, mentioned above. In one embodiment of the present invention where a wideband CDMA signal is present within, e.g., the bandwidth corresponding to a first carrier at the input port to DAU 105, the transmitted signal at the antenna ports of DRU 125A, DRU 1256 and DRUk will be a wideband CDMA signal which is virtually identical to the signal present within the bandwidth corresponding to that first carrier at the input port to DAU 105.

[0054] As disclosed in U.S. Provisional Application S.N. 61/374,593, again identified above, and also referring to Figure 1 of the instant patent application, it is to be understood that the Digital Up Converters present in the respective DRUs can be programmed to transmit any desired composite signal format to each of the respective DRU antenna ports. As an example, the Digital Up Converters present in DRU 125A and DRU 125B can be dynamically software-reconfigured as described previously so that the signal present at the antenna port of DRU 125A would correspond to the spectral profile shown in Figure 1 as 155A and also that the signal present at the antenna port of DRU 125B would correspond to the spectral profile shown in Figure 1 as 155B. The application for such a dynamic re-arrangement of DRU capacity would be e.g., if a company meeting were suddenly convened in the area of the enterprise corresponding to the coverage area of DRU 125B.

[0055] Referring again to Figure 2, another embodiment of the Distributed Antenna System of the present invention can be better understood. As disclosed in the aforementioned U.S. Provisional Application S.N. 61/374,593, and also as shown in Figure 2, the optical ring transport mechanism can be implemented with regard to uplink signals. As discussed previously with regard to downlink signals and by referring to Figure 1, the uplink system shown in Figure 2 is mainly comprised of DAU 105, together with DRU's 125A-125k. In a manner similar to the

downlink operation explained by referring to Figure 1, the operation of the uplink system shown in Figure 2 can be understood as follows.

[0056] The Digital Down Converters present in each of DRU's 125A-*k* are dynamically software-configured as described previously so that uplink signals of the appropriate desired signal format(s) present at the receive antenna ports of the respective DRU's 125A-125k are selected based on the desired uplink band(s) to be processed and filtered, converted and transported to the appropriate uplink output port of DAU 105. The DAU and DRUs frame the individual data packets corresponding to their respective radio signature using the Common Public Radio Interface (CPRI) standard. Other Interface standards are applicable provided they uniquely identify data packets with respective DRUs. Header information is transmitted along with the data packet which indentifies the DRU and DAU that corresponds to the individual data packet.

[0057] In one example for the embodiment shown in Figure 2, DRU's 125A and 125C are configured to receive uplink signals within the Channel K bandwidth, whereas DRU 1256 and DRU 125*n* are both configured to reject uplink signals within the Channel K bandwidth. When DRU 125C receives a strong enough signal at its receive antenna port within the Channel K bandwidth to be properly filtered and processed, the Digital Down Converters within DRU 125C facilitate processing and conversion. Similarly, when DRU 125A receives a strong enough signal at its receive antenna port within the Channel K bandwidth to be properly filtered and processed, the Digital Down Converters within DRU 125A facilitate processing and conversion. The signals from DRU 125A and DRU 125C are combined based on the active signal combining algorithm, and are fed to the base station connected to the uplink output port of DAU 105. The term simulcast is frequently used to describe the operation of DRU125A and DRU 125C with regard to uplink and downlink signals within Channel K bandwidth. The term Flexible Simulcast refers to the fact that the present invention supports dynamic and/or manual rearrangement of which specific DRU are involved in the signal combining process for each Channel bandwidth.

[0058] Referring still to Figure 2, the Digital Down Converters present in DRU 125A are configured to receive and process signals within Channel J-Q bandwidths. The Digital Down Converters present in DRU 1256 are configured to receive and process signals within Channel J,

L, M and O bandwidths. The Digital Down Converters present in DRU 125C are configured to receive and process signals within Channel K and O bandwidths. The Digital Down Converters present in DRU 125*n* are configured to receive and process signals within Channel J, M, N and Q bandwidths. The respective high-speed digital signals resulting from processing performed within each of the four DRU are routed to the DAU. As described previously, the uplink signals from the four DRUs are combined within the respective DAU corresponding to each base station.

[0059] In summary, the Reconfigurable Distributed Antenna System of the present invention described herein efficiently conserves resources and reduces costs. The reconfigurable system is adaptive or manually field-programmable, since the algorithms can be adjusted like software in the digital processor at any time.

[0060] Referring next to Figure 5, an alternative embodiment of the present invention may be better understood. Figure 5 provides a daisy chain example of a distributed antenna system (DAS). Each DRU has a coverage radius that can be adjusted based on the power transmission from that particular remote unit. The DAU controls the various DRU's transmission power and can optimize the overall coverage zone. In the illustrated embodiment, DAU 502, again under the control of a NOC (not shown), is associated with a base station 501 and in turn interfaces with three DRU's 503, 504 and 505. A user 506 with a mobile device is provided relatively uniform coverage throughout the area covered by the three DRU's.

[0061] Referring next to Figure 6, a still further alternative embodiment may be better appreciated. Figure 6 shows an embodiment of a multi-band system illustrating one DAU supporting up to six different services operating at different frequency bands, with three optical rings of DRU's 1-60. The input frequency bands 605-630 (here denoted as six frequency bands at 700, 800, 850, 1900, 2100 and 2600 MHz) are input into the DAU 600 from the BTS's (not shown). The DAU includes, among other functionalities discussed herein, an RF IN portion for each band, and a digital distribution matrix for distributing the frequency bands to a plurality of DRU's, indicated as DRU1-DRU60, daisy-chained along three separate rings 635, 640 and 645 for achieving the desired coverage. The frequency bands are transported to either all or a subset of DRUs. The particular number of frequency bands, DAU's, DRU's and rings is exemplary

only, and can, in practice, be any number appropriate to the performance capabilities and needs of the network.

[0062] Referring next to Figure 7 that illustrates embedded software control modules, the software embedded in the DAU and DRU, which controls the operation of key functions of these devices, can be better understood. In particular, the DAU embedded software control module 700 comprises a DAU Management Control Module 705 and a DAU monitoring module 710. The DAU Management Control Module 705 communicates with the NOC 715, and also the DAU monitoring module 710. One such key function is determining and/or setting the appropriate amount of radio resources (such as RF carriers, CDMA codes or TDMA time slots) assigned to a particular DRU or group of DRUs to meet desired capacity and throughput objectives. As noted previously, the NOC 715 monitors the DAS operation and sends commands to the DAU's for configuring various functions of the DRU's as well as the DAU, in at least some embodiments.

[0063] The DAU Monitoring module, in addition to other functions, detects which carriers and corresponding time slots are active for each DRU. The DAU Management Control module communicates with the DRU Embedded Software Control module 720 over a fiber optic link control channel via a control protocol. In an embodiment, the control protocol comprises headers together with packets of data, such that both control information and data are transmitted to the DRU's together as a message. DRU functions or features that the header would control in the DRU are typically implementation specific and can include, among other things, measuring uplink and downlink power, measuring gain of uplink and downlink, and monitoring alarms in the DRU.

[0064] In turn, the DRU Management Control module 725 within the DRU Embedded Software Control Module sets the individual parameters of all the DRU Digital Up-Converters 730 to enable or disable specific radio resources from being transmitted by a particular DRU or group of DRUs, and also sets the individual parameters of all the DRU Digital Down-Converters 735 to enable or disable specific radio resources from being transmitted by a particular DRU or group of DRUs. In addition, the DRU Embedded Software Control Module comprises a DRU Pilot Beacon Control Module 740, which communicates with a DRU Pilot Beacon 745.

[0065] Referring next to Figure 8, an embodiment of a daisy-chained configuration of DAU's is illustrated, together with a daisy-chained configuration of DRU's. In an embodiment, a plurality of base stations 800A-800n are each associated with one of DAU's 805A-n. The DAU's are daisy-chained, and each DAU communicates with one or more daisy-chains 810A-810m of DRU's which may or may not be arranged in a ring configuration. It will be appreciated that the DAU's can also be configured in a ring configuration, as discussed above.

[0066] An algorithm operating within the DAU Monitoring module which detects which carriers and corresponding time slots for each carrier are active for each DRU provides information to the DAU Management Control module to help identify when, e.g., a particular downlink carrier is loaded by a percentage greater than a predetermined threshold whose value is communicated to the DAU Management Control module by the DAU's Remote Monitoring and Control function 715. If that occurs, the DAU Management Control module can adaptively modify the system configuration to begin to deploy, typically although not necessarily slowly, additional radio resources (such as RF carriers, CDMA codes or TDMA time slots) for use by a particular DRU which need those radio resources within its coverage area. At the same time, usually the DAU Management Control module adaptively modifies the system configuration to begin to remove, again typically slowly, certain radio resources (such as RF carriers, CDMA codes or TDMA time slots) for use by a particular DRU where that DRU no longer needs those radio resources within its coverage area.

[0067] Although the present invention has been described with reference to the preferred embodiments, it will be understood that the invention is not limited to the details described thereof. Various substitutions and modifications have been suggested in the foregoing description, and others will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended claims.

APPENDIX I

Glossary of Terms

ACLR	Adjacent Channel Leakage Ratio
ACPR	Adjacent Channel Power Ratio
ADC	Analog to Digital Converter
AQDM	Analog Quadrature Demodulator
AQM	Analog Quadrature Modulator
AQDMC	Analog Quadrature Demodulator Corrector
AQMC	Analog Quadrature Modulator Corrector
BPF	Bandpass Filter
BTS	Base Transceiver System or Base Station
CDMA	Code Division Multiple Access
CFR	Crest Factor Reduction
DAC	Digital to Analog Converter
DAU	Digital Access Unit
DET	Detector
DHMPA	Digital Hybrid Mode Power Amplifier
DDC	Digital Down Converter
DNC	Down Converter
DPA	Doherty Power Amplifier
DQDM	Digital Quadrature Demodulator
DQM	Digital Quadrature Modulator
DSP	Digital Signal Processing
DUC	Digital Up Converter
EER	Envelope Elimination and Restoration
EF	Envelope Following
ET	Envelope Tracking
EVM	Error Vector Magnitude
FFLPA	Feedforward Linear Power Amplifier
FIR	Finite Impulse Response

	FPGA	Field-Programmable Gate Array
	GSM	Global System for Mobile communications
	I-Q	In-phase / Quadrature
	IF	Intermediate Frequency
5	LINC	Linear Amplification using Nonlinear Components
	LO	Local Oscillator
	LPF	Low Pass Filter
	MCPA	Multi-Carrier Power Amplifier
	MDS	Multi-Directional Search
10	OFDM	Orthogonal Frequency Division Multiplexing
	PA	Power Amplifier
	PAPR	Peak-to-Average Power Ratio
	PD	Digital Baseband Predistortion
	PLL	Phase Locked Loop
15	PN	Pseudo-Noise
	QAM	Quadrature Amplitude Modulation
	QPSK	Quadrature Phase Shift Keying
	RF	Radio Frequency
	RRH	Remote Radio Head
20	RRU	Remote Radio Head Unit
	SAW	Surface Acoustic Wave Filter
	UMTS	Universal Mobile Telecommunications System
	UPC	Up Converter
	WCDMA	Wideband Code Division Multiple Access
25	WLAN	Wireless Local Area Network

WHAT IS CLAIMED IS:

1. A method for routing and switching operator RF signals comprising:

providing one or more remote radio units, each configured to receive one or more downlink radio frequencies and to transmit one or more uplink radio frequencies,

providing at least one digital access unit configured to communicate with at least some remote radio units,

linking in a loop configuration the one or more remote radio units and the at least one digital access unit whereby each remote radio unit can be accessed in either direction around the loop, and

routing and switching packetized signals among the one or more radio units and the at least one digital access unit.

ABSTRACT OF THE DISCLOSURE

The present disclosure is a novel utility of a software defined radio (SDR) based Distributed Antenna System (DAS) that is field reconfigurable and support multi-modulation schemes (modulation-independent), multi-carriers, multi-frequency bands and multi-channels. The present invention enables a high degree of flexibility to manage, control, enhance, facilitate the usage and performance of a distributed wireless network such as Flexible Simulcast, automatic traffic load-balancing, network and radio resource optimization, network calibration, autonomous/assisted commissioning, carrier pooling, automatic frequency selection, frequency carrier placement, traffic monitoring, traffic tagging, pilot beacon, etc. As a result, a DAS in accordance with the present invention can increase the efficiency and traffic capacity of the operators' wireless network.

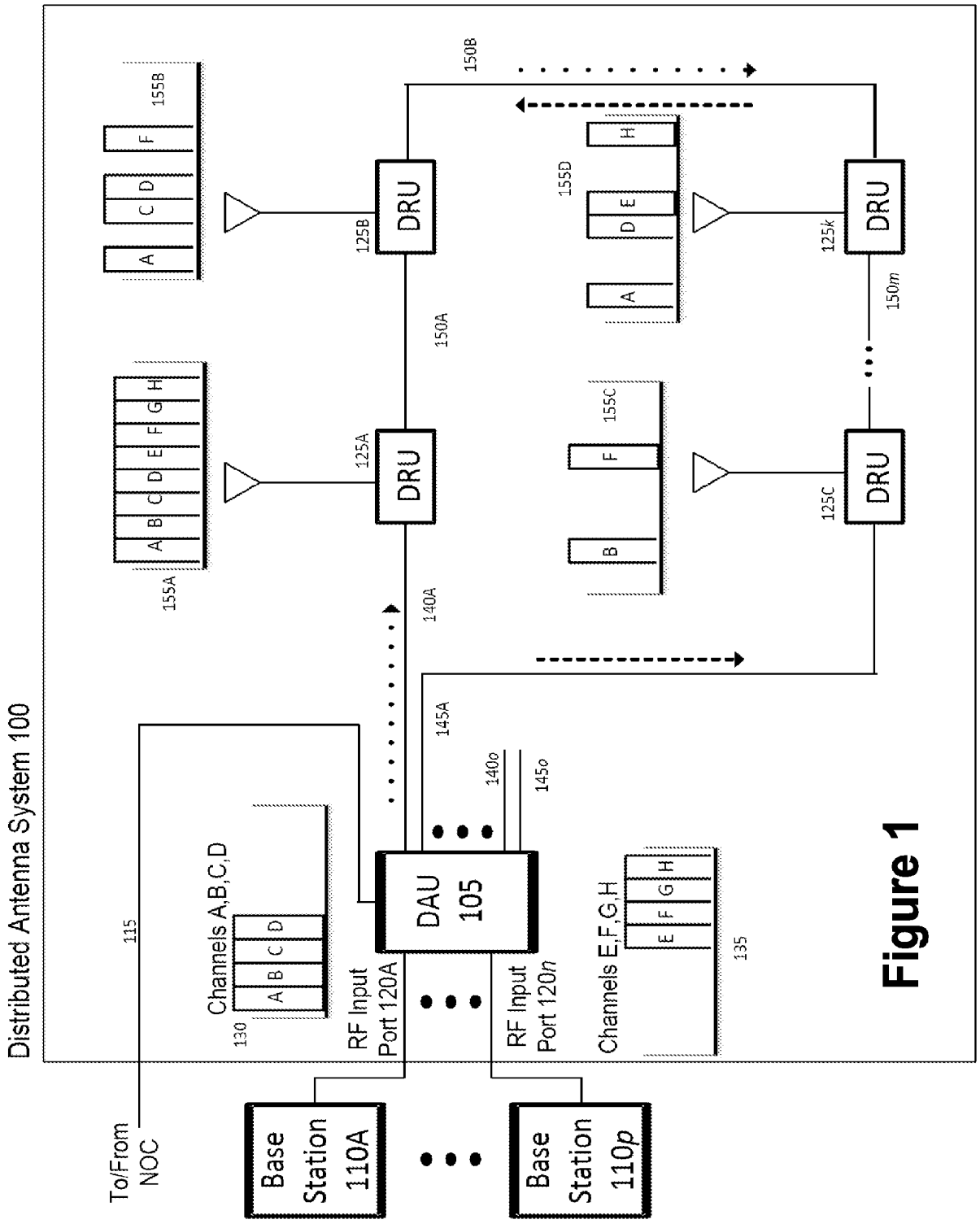

Distributed Antenna System 100
To/From NOC
115
Base Station 110A
Base Station 110p
DAU 105
RF Input Port 120A
RF Input Port 120n
Channels A,B,C,D
130
Channels E,F,G,H
135
140A
140o
145A
145o
150A
150B
150m
DRU
125A
125B
125C
125k
155A
155B
155C
155D
A B C D E F G H

Figure 1

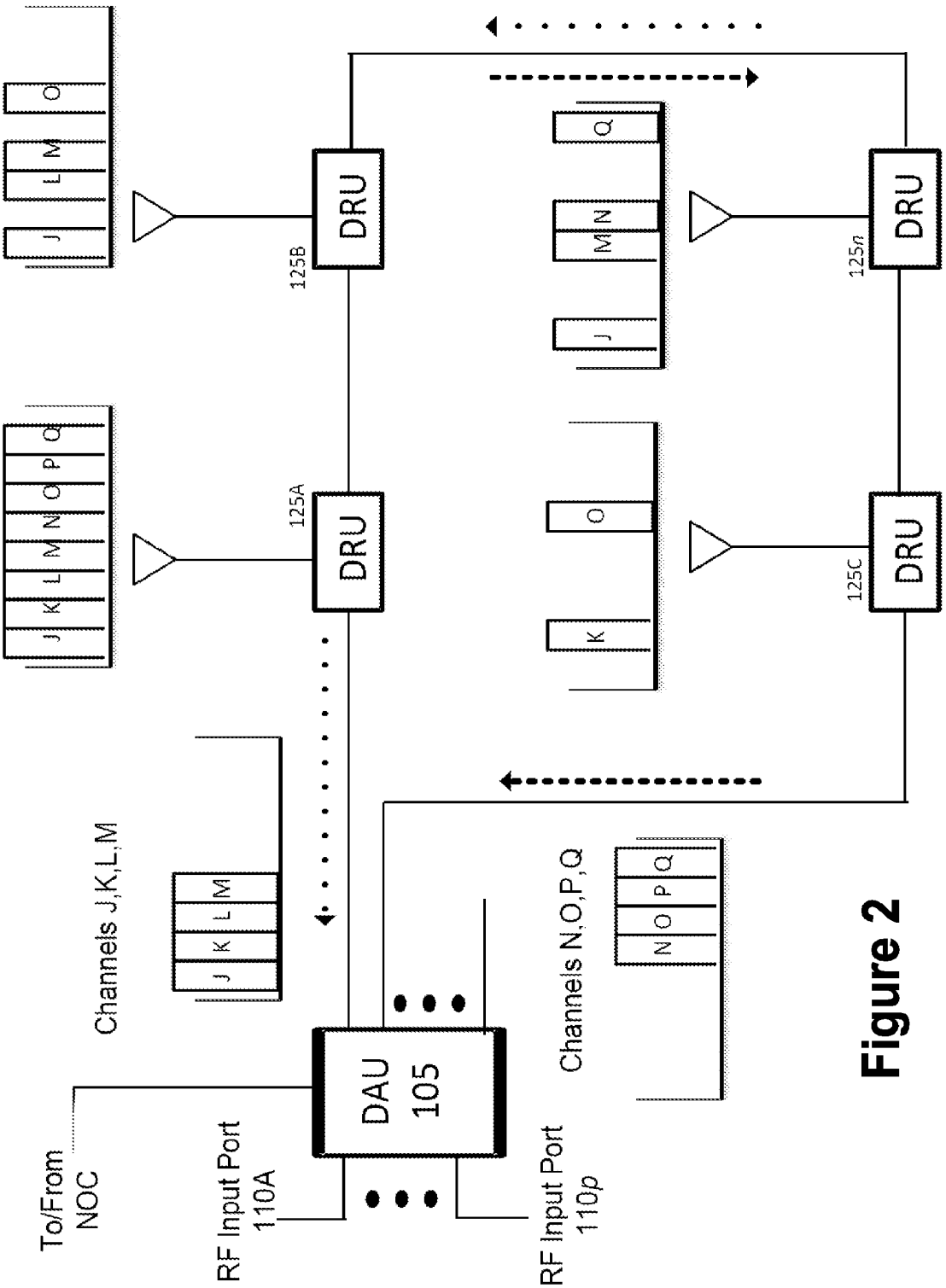

DRU
125A
125B
125C
125n
DAU
105
Channels J,K,L,M
Channels N,O,P,Q
To/From
NOC
RF Input Port
110A
RF Input Port
110p

Figure 2

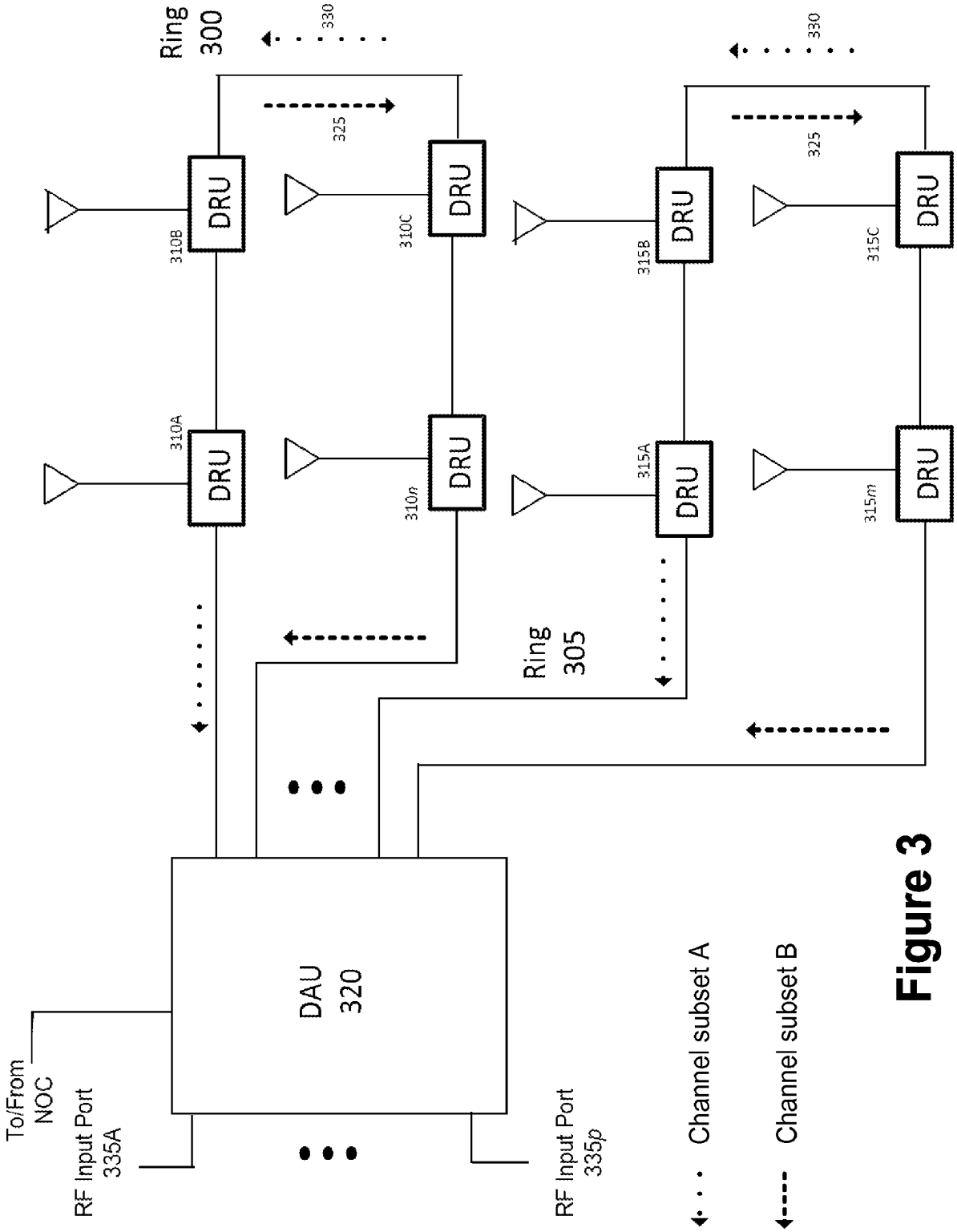

Ring
300
330
325
DRU
310B
310C
315B
315C
310A
310n
315A
315m
Ring
305
DAU
320
To/From
NOC
RF Input Port
335A
RF Input Port
335p
Channel subset A
Channel subset B

Figure 3

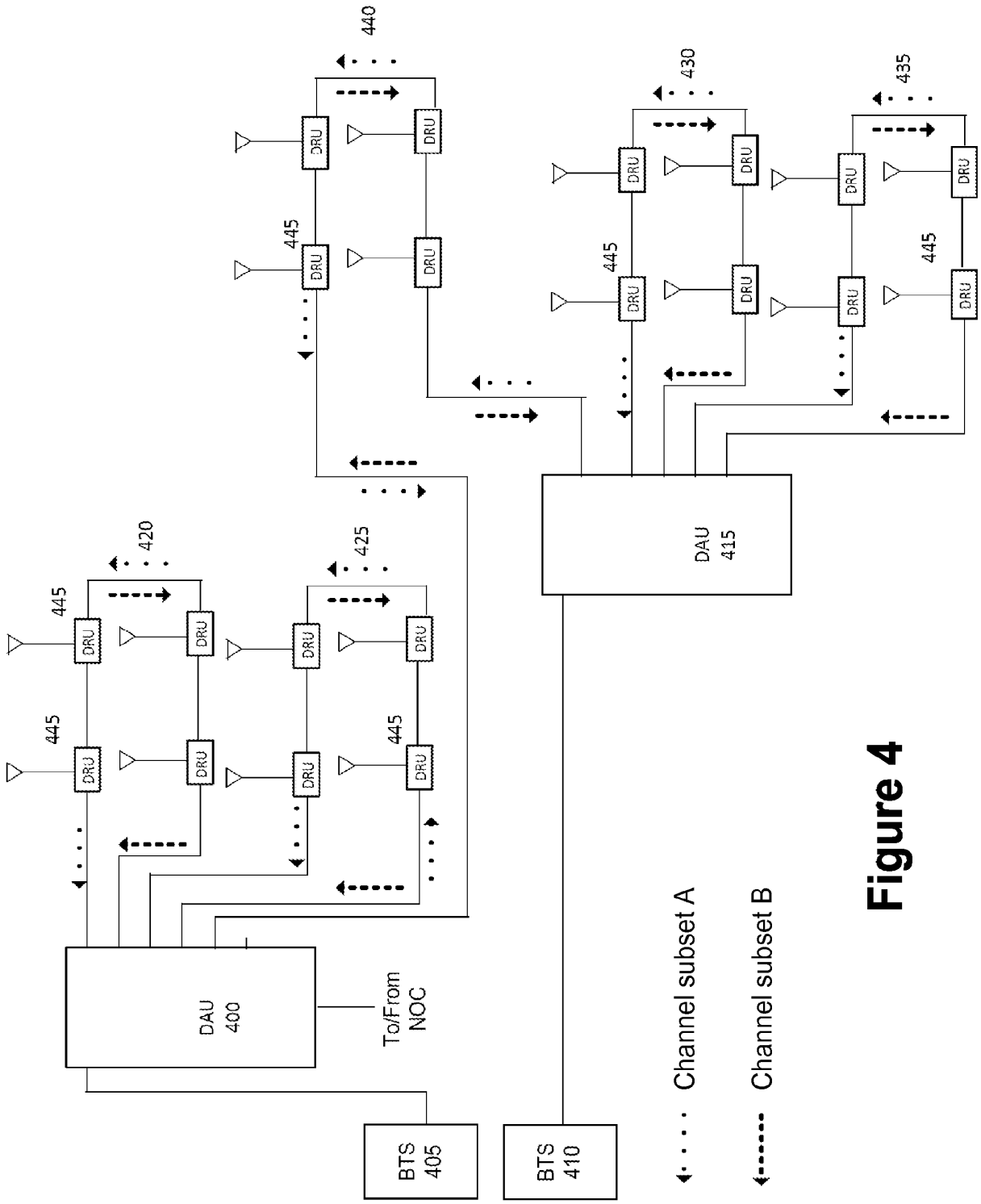

440
430
435
445
DRU
DAU
415
420
425
DAU
400
To/From
NOC
BTS
405
BTS
410
Channel subset A
Channel subset B

Figure 4

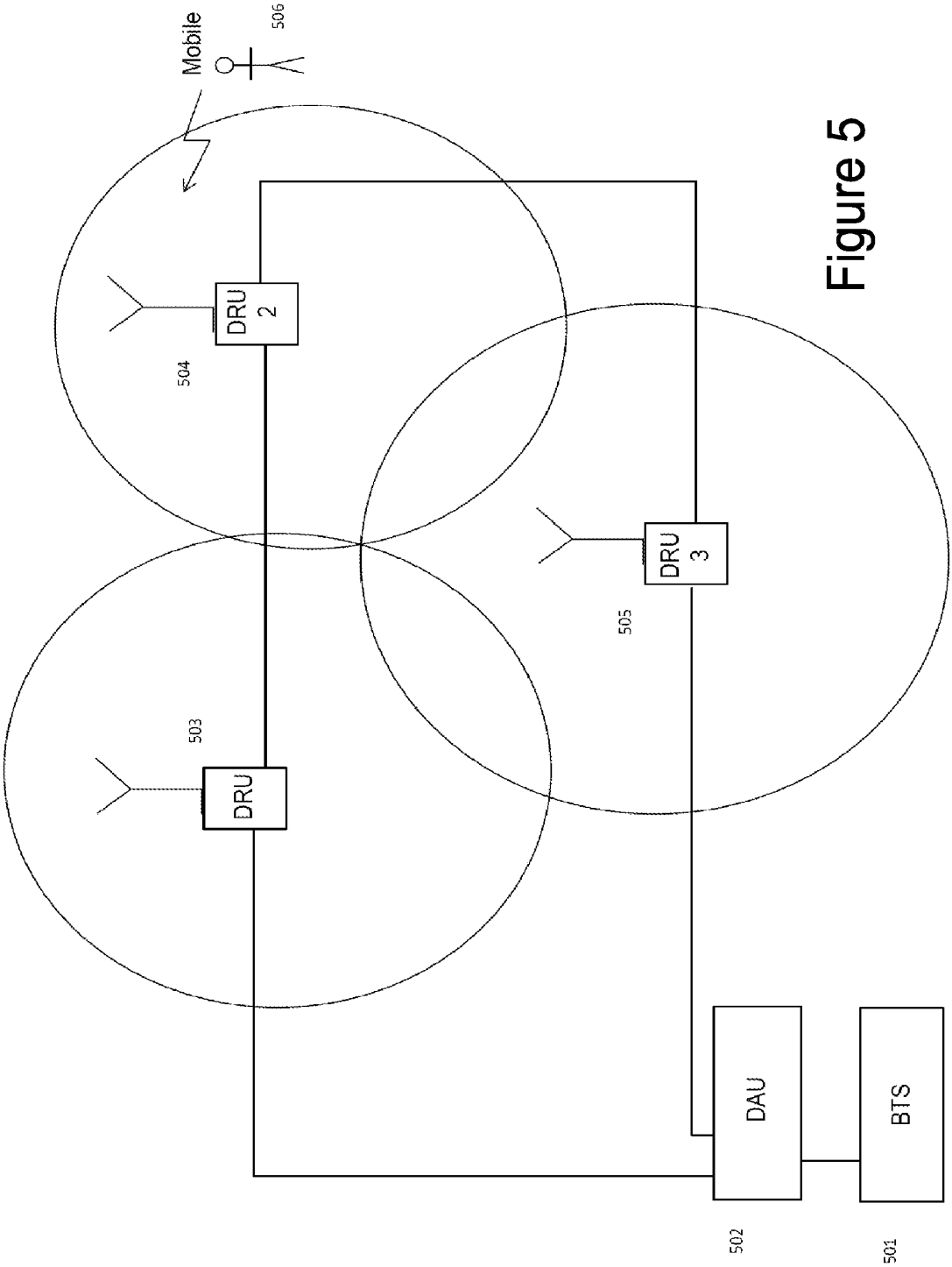


Figure 5

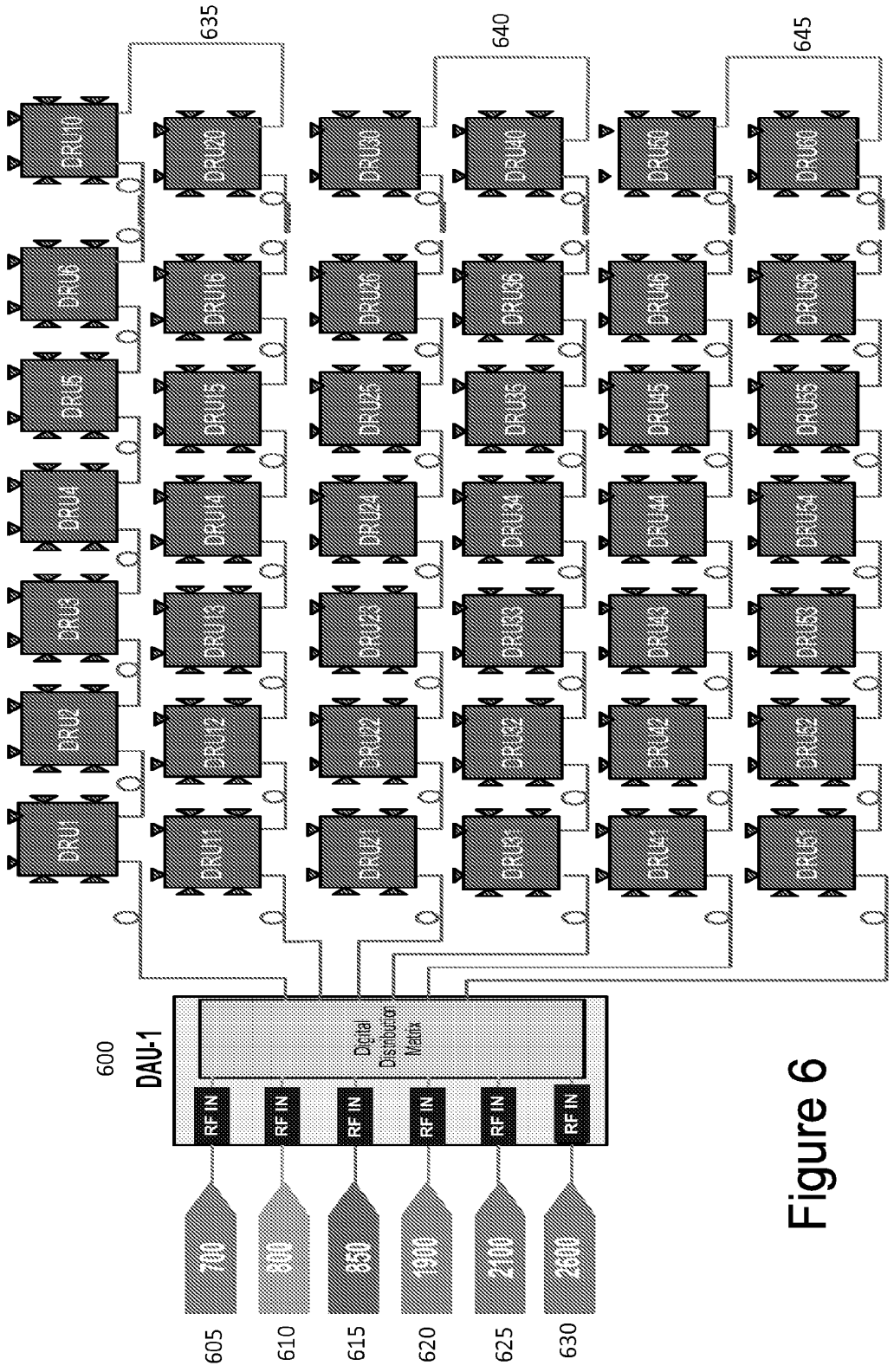

600
DAU-1
Digital Distribution Matrix
RF IN
RF IN
RF IN
RF IN
RF IN
RF IN
700
800
850
1900
2100
2600
605
610
615
620
625
630
635
640
645
DRU1
DRU2
DRU3
DRU4
DRU5
DRU6
DRU10
DRU11
DRU12
DRU13
DRU14
DRU15
DRU16
DRU20
DRU21
DRU22
DRU23
DRU24
DRU25
DRU26
DRU30
DRU31
DRU32
DRU33
DRU34
DRU35
DRU36
DRU40
DRU41
DRU42
DRU43
DRU44
DRU45
DRU46
DRU50
DRU51
DRU52
DRU53
DRU54
DRU55
DRU56
DRU60
DRU61
DRU62
DRU63
DRU64
DRU65
DRU66

Figure 6

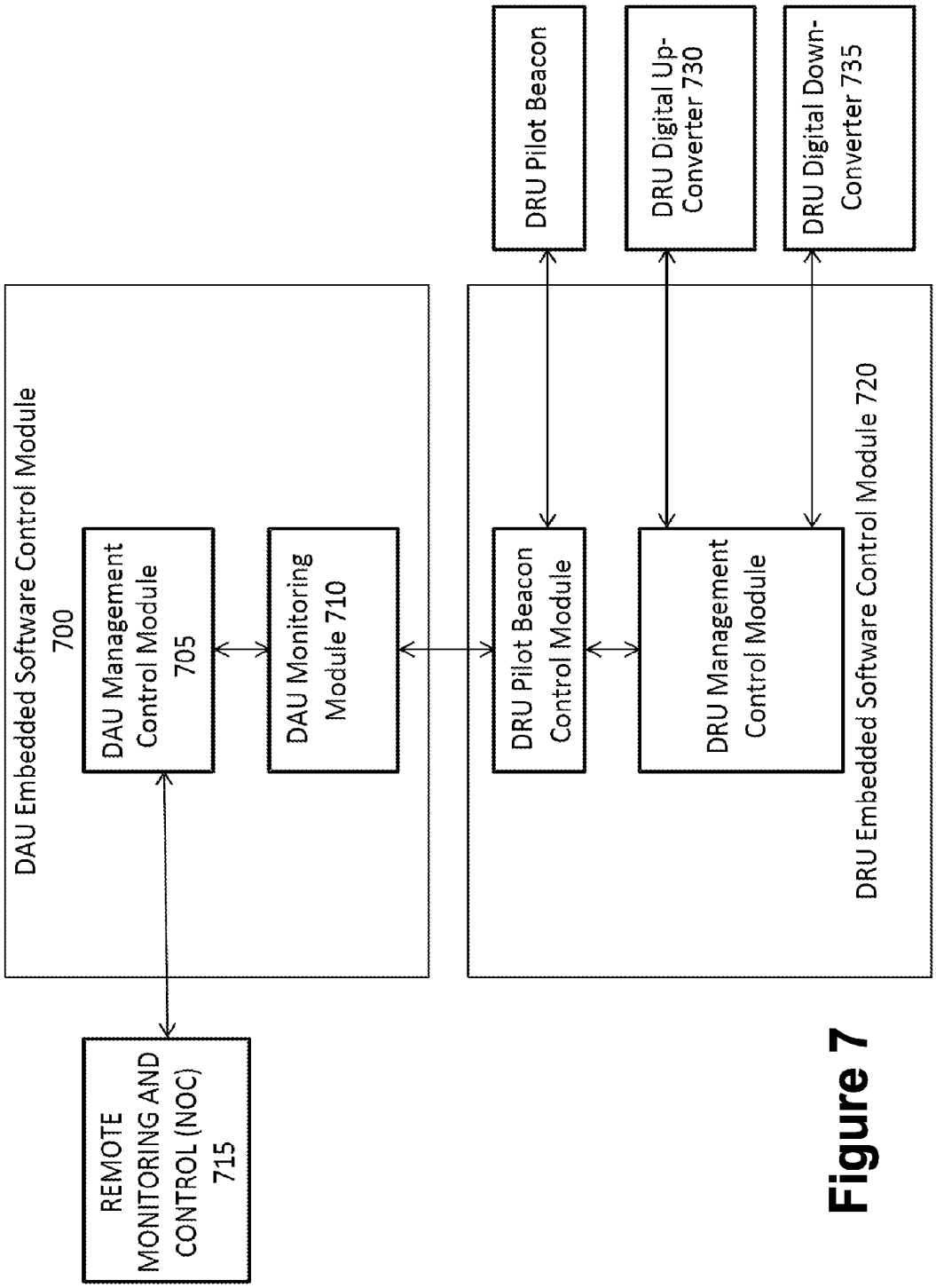

DAU Embedded Software Control Module 700
DAU Management Control Module 705
DAU Monitoring Module 710
REMOTE MONITORING AND CONTROL (NOC) 715
DRU Embedded Software Control Module 720
DRU Pilot Beacon Control Module
DRU Management Control Module
DRU Pilot Beacon
DRU Digital Up-Converter 730
DRU Digital Down-Converter 735

Figure 7

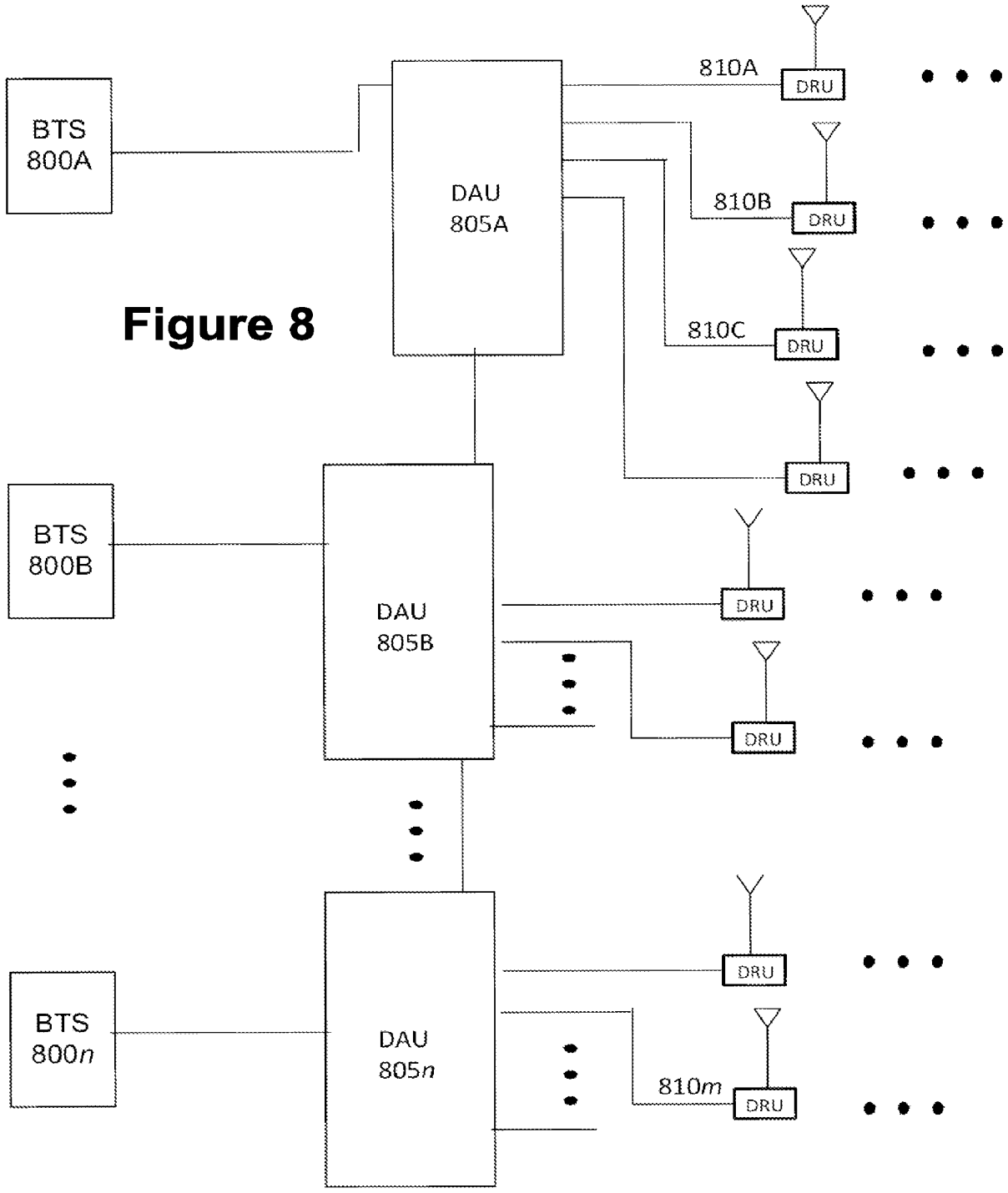

BTS
800A
DAU
805A
810A
DRU
810B
DRU
810C
DRU
DRU
BTS
800B
DAU
805B
DRU
DRU
BTS
800n
DAU
805n
DRU
810m
DRU

Figure 8

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	DISTRIBUTED ANTENNA SYSTEM

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/800,515

filed on July 15, 2015

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

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

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

WARNING:

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

LEGAL NAME OF INVENTOR

Inventor: Shawn Patrick Stapleton Date (Optional): _____

Signature: _____

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

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

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

PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	DISTRIBUTED ANTENNA SYSTEM

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/800,515

filed on July 15, 2015

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

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

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

WARNING:

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LEGAL NAME OF INVENTOR

Inventor: Paul Lemson Date (Optional): OCT 4 2015

Signature: _____

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

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

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LEGAL NAME OF INVENTOR

Inventor: Bin Lin Date (Optional): _____

Signature: _____

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

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

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☐ The attached application, or

☒ United States application or PCT international application number 14/800,515

filed on July 15, 2015

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LEGAL NAME OF INVENTOR

Inventor: Albert S. Lee Date (Optional): _____

Signature: _____

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

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

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PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Dali Wireless, Inc.

Application No./Patent No.: unassiged Filed/Issue Date: herwith

Titled: DISTRIBUTED ANTENNA SYSTEM

Dali Wireless, Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Shawn Patrick Stapleton, Paul Lemson, Bin Lin To: Dali Systems Co. Ltd.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 027052, Frame 0064, or for which a copy thereof is attached.

2. From: Albert S. Lee To: Dali Systems Co. Ltd.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 036229, Frame 0936, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Dali Systems Co. Ltd. To: Dali Wireless, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 045126, Frame 0677, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Kelvin B. Catmull/	August 9, 2018
Signature	Date
Kelvin B. Catmull	57535
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

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

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

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

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/059,434

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	1 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	785		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

20350
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

FORMALITIES LETTER

OC000000101862953

Date Mailed: 08/28/2018

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

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

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

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

- $ **75** basic filing fee.
- $ **80** surcharge.
- $ **330** search fee.
- $ **380** examination fee.
- $(**0**) previous unapplied payment amount.
- $ **865** TOTAL FEE BALANCE DUE.

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

Replies should be mailed to:

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

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

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

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

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

/ldvan/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/059,434	08/09/2018		0.00	091172-1100459-102450US	1	1

CONFIRMATION NO. 2049

FILING RECEIPT

20350
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309



Date Mailed: 08/28/2018

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

Inventor(s)

Shawn Patrick Stapleton, Vancouver, CANADA;
Paul Lemson, Woodinville, WA;
Bin Lin, Burnaby, CANADA;
Albert S. Lee, San Mateo, CA;

Applicant(s)

Dali Wireless, Inc., Menlo Park, CA;

Assignment For Published Patent Application

Dali Wireless, Inc., Menlo Park, CA

Power of Attorney: The patent practitioners associated with Customer Number 20350

Domestic Priority data as claimed by applicant

This application is a CON of 15/223,819 07/29/2016
which is a CON of 14/800,515 07/15/2015 PAT 9419837
which is a CON of 14/260,145 04/23/2014 PAT 9137078
which is a CON of 13/211,247 08/16/2011 PAT 8737300
which claims benefit of 61/439,940 02/07/2011

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

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

If Required, Foreign Filing License Granted: 08/27/2018
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/059,434**
Projected Publication Date: To Be Determined - pending completion of Missing Parts
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****
Title

DISTRIBUTED ANTENNA SYSTEM

Preliminary Class

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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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 (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

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SelectUSA

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

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

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on December 28, 2018.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Shawn Patrick Stapleton et al.
Application No.: 16/059,434
Filed: Aug 9, 2018
For: DISTRIBUTED ANTENNA SYSTEM
Customer No.: 20350

Confirmation No.: 2049
Examiner:
Technology Center/Art Unit:

RESPONSE TO
NOTICE OF MISSING PARTS

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

Commissioner:

Pursuant to the Notice to File Missing Parts of Nonprovisional Application, dated August 28, 2018, transmitted herewith are papers in the above-identified application.

☒ Formalities Letter – Notice to File Missing Parts of Application – Filing Date Granted.
☒ Petition for Extension of Time Under 37 C.F.R. § 1.136.
☒ Payment in the amount of **$1,165** is submitted.
☐ Form PTO-2038 is attached.
☒ The Commissioner is hereby authorized to charge any additional fees required under 37 CFR §1.16, or credit any overpayment, to Account No. 20-1430.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535
Tel: (650) 326-2400
Email: kcatmull@kilpatricktownsend.com

71119174V.1

COPY

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
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

20350
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

FORMALITIES LETTER

OC000000101862953

Date Mailed: 08/28/2018

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

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

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

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

- $ **75** basic filing fee.
- $ **80** surcharge.
- $ **330** search fee.
- $ **380** examination fee.
- $(**0**) previous unapplied payment amount.
- $ **865** TOTAL FEE BALANCE DUE.

COPY

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

Replies should be mailed to:

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

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

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

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

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

/ldvan/

Electronic Patent Application Fee Transmittal

Application Number:	16059434
Filing Date:	09-Aug-2018
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Filer:	Kelvin B. Catmull/Vanessa Aguilar
Attorney Docket Number:	091172-1100459-102450US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 2 months with $0 paid	2252	1	300	300
Miscellaneous:				
		Total in USD ($)		**1165**

Electronic Acknowledgement Receipt	
EFS ID:	34720253
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull
Filer Authorized By:	
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	28-DEC-2018
Filing Date:	09-AUG-2018
Time Stamp:	18:07:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1165
RAM confirmation Number	123118INTEFSW18073700
Deposit Account	201430
Authorized User	IP eFiling
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 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	Extension of Time	EOT_091172-1100459.pdf	135041 21dfffed33b0f9fc07fcf260ecfacae78365f6b4	no	1
Warnings:					
Information:					
2	Applicant Response to Pre-Exam Formalities Notice	Response_MP_091172-1100459.pdf	96140 dea5b480c246fc5f9caa8f0aeebac8971811851c	no	1
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	COPY_NOA_MP.PDF	178349 4232cca1ddeac29a2d419f66a6d84e13d9d5066b	no	2
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	39295 977c54f0cba3b285fd3fe366507ddcd7d1465a36	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	448825		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/AIA/22 (03-13)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 091172-1100459-102450US
Application Number 16/059,434	Filed August 9, 2018
For DISTRIBUTED ANTENNA SYSTEM	
Art Unit	Examiner

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	Micro Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$200	$100	$50	$____
☒ Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$300
☐ Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$____
☐ Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$____
☐ Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$____

☒ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 20-1430.

☒ Payment made via EFS-Web.
WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☒ attorney or agent of record. Registration Number 57,535

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____

/Kelvin B. Catmull/	December 28, 2018
Signature	Date
Kelvin B. Catmull	(650) 326-2400
Typed or printed name	Telephone Number

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

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/059,434	08/09/2018		865	091172-1100459-102450US	1	1

CONFIRMATION NO. 2049

UPDATED FILING RECEIPT

20350
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

Date Mailed: 01/03/2019

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

Inventor(s)

Shawn Patrick Stapleton, Vancouver, CANADA;
Paul Lemson, Woodinville, WA;
Bin Lin, Burnaby, CANADA;
Albert S. Lee, San Mateo, CA;

Applicant(s)

Dali Wireless, Inc., Menlo Park, CA;

Assignment For Published Patent Application

Dali Wireless, Inc., Menlo Park, CA

Power of Attorney: The patent practitioners associated with Customer Number 20350

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which is a CON of 14/800,515 07/15/2015 PAT 9419837
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Projected Publication Date: 04/11/2019
Non-Publication Request: No
Early Publication Request: No
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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 (1-866-999-4258).

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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

NOT GRANTED

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SelectUSA

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

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

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/059,434

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	1 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	785		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on January 7, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Kelvin B. Catmull/

Kelvin B. Catmull

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton et al.	Examiner: Ricky Quoc Ngo
Application No.: 16/059,434	Technology Center/Art Unit: 2464
Filed: August 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	**PRELIMINARY AMENDMENT**
Customer No.: 20350	

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

Commissioner:

Prior to examination of the above-referenced application, please enter the following amendments and consider the following remarks:

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

Remarks/Arguments begin on page 5 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Canceled)

2. (New) A host unit for use in the transport of wireless communications, comprising:

at least one interface to communicatively couple the host unit to at least one signal source;

wherein the host unit is configured to receive a plurality of downlink signals from the at least one signal source, each downlink signal of the plurality of downlink signals comprising a plurality of carriers;

at least one interface to communicatively couple the host unit to a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the host unit is configured to send a digital representation of any carrier of any downlink signal it receives to any of the plurality of remote units; and

wherein the host unit is configured to receive a digital representation of at least one uplink signal from each of the plurality of remote units.

3. (New) The host unit of claim 2 wherein the host unit is configured to packetize the plurality of downlink signals it receives in compliance with the Common Public Radio Interface (CPRI) standard.

4. (New) The host unit of claim 2 wherein the at least one interface to communicatively couple the host unit to the plurality of remote units comprises an optical interface.

5. (New) The host unit of claim 2 wherein the host unit is configured to I/Q map and frame the plurality of downlink signals it receives to provide at least the digital representation of the first portion and the digital representation of the second portion.

6. (New) A host unit for use in the transport of wireless communications, comprising:

at least one interface to communicatively couple the host unit to at least one signal source;

wherein the host unit is configured to receive a plurality of downlink signals from the at least one signal source, each downlink signal of the plurality of downlink signals comprising a plurality of carriers;

at least one interface to communicatively couple the host unit to one or more additional host units;

wherein the host unit is configured to send a digital representation of any carrier of any downlink signal it receives to the one or more additional host units;

at least one interface to communicatively couple the host unit to a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the host unit is configured to send a digital representation of any carrier of any downlink signal it receives to any of the plurality of remote units; and

wherein the host unit is configured to receive a digital representation of at least one uplink signal from each of the plurality of remote units.

7. (New) The host unit of claim 6 wherein the at least one interface to communicatively couple the host unit to the one or more additional host units comprises an optical interface.

8. (New) The host unit of claim 6 wherein the one or more additional host units includes a plurality of additional host units, and the host unit is connected to at least one of the plurality of additional host units through a direct connection and at least one of the plurality of additional host units through an indirect connection.

9. (New) The host unit of claim 6 wherein the at least one interface to communicatively couple the host unit to the at least one signal source includes a plurality of interfaces to communicatively couple the host unit to a plurality of signal sources.

REMARKS/ARGUMENTS

Upon entry of the present amendment, claims 2-9 will be pending in this application. Claim 1 has been canceled, and new claims 2-9 have been added. No new matter is added.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this application are in condition for examination.

Except for the issue fees payable under 37 C.F.R. § 1.18, the Director is authorized to charge any additional fees during pendency of this application, including any required extension of time fees, or credit any overpayment to Deposit Account Number 20-1430. This paragraph is intended to be a constructive petition for extension of time in accordance with 37 C.F.R. § 1.136(a)(3).

If the Examiner believes a telephone conference would expedite prosecution of this application, please contact the undersigned at (650) 326-2400 or kcatmull@kilpatricktownsend.com.

Respectfully submitted,

/Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

KBC:bsk

71119209V.1

Electronic Acknowledgement Receipt	
EFS ID:	34785523
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull
Filer Authorized By:	
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	07-JAN-2019
Filing Date:	09-AUG-2018
Time Stamp:	19:56:31
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		102450US.pdf	87925 bdbcebb4c82c79c1cad328f79caa802a7a29f3e5	yes	5

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	5
Warnings:			
Information:			
	Total Files Size (in bytes):	87925	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/059,434	Filing Date 08/09/2018	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	01/07/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 8	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $230 =	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 $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/FREDERICK E BRISCOE/
*** 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

20350 7590 02/08/2019

KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

EXAMINER	
ZHAO, WEI	

ART UNIT	PAPER NUMBER
2473	

NOTIFICATION DATE	DELIVERY MODE
02/08/2019	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):

KTSDocketing2@kilpatrick.foundationip.com
ipefiling@kilpatricktownsend.com

PTOL-90A (Rev. 04/07)

Applicant-Initiated Interview Summary	**Application No.** 16/059,434	**Applicant(s)** Stapleton et al.	
	Examiner WEI ZHAO	**Art Unit** 2473	**AIA Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) WEI ZHAO. (3) _____.

(2) KELVIN B. CATMULL. (4) _____.

Date of Interview: 04 February 2019.

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

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

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

Claim(s) discussed: 2-4.

Identification of prior art discussed: US 9,419,837.

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

Applicant's representative reached out to the examiner to talk about the invention and the claim limitations submitted January 7, 2019. The examiner mentioned the likelihood of double patenting issue.
Both side agreed the discussion had some positive impact on the examination. Applicant is considering to submit a revision of the claim limitations. Examiner will reconsider if filed..

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

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

☐ Attachment

/WEI ZHAO/ Primary Examiner, Art Unit 2473	

Summary of Record of Interview Requirements

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

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

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

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

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

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

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

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

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

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

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

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

Examiner to Check for Accuracy

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

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on February 11, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton et al.	Examiner: Wei Zhao
Application No.: 16/059,434	Technology Center/Art Unit: 2473
Filed: August 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	**PRELIMINARY AMENDMENT**
Customer No.: 20350	

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

Commissioner:

Prior to examination of the above-referenced application, please enter the following amendments and consider the following remarks:

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

Remarks/Arguments begin on page 6 of this paper.

Electronic Acknowledgement Receipt	
EFS ID:	35118466
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull/Vanessa Aguilar
Filer Authorized By:	Kelvin B. Catmull
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	11-FEB-2019
Filing Date:	09-AUG-2018
Time Stamp:	17:55:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Preliminary_Amendment_091172-1100459.pdf	91428 128f425ea3887c7e22de41296acab2f8c65a493f	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	6	6
	Claims	2	5
	Preliminary Amendment	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	91428	

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.

REMARKS/ARGUMENTS

Upon entry of the present amendment, claims 10-29 will be pending in this application. Claims 1-9 been canceled, and new claims 10-29 have been added. No new matter is added.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this application are in condition for examination.

Except for the issue fees payable under 37 C.F.R. § 1.18, the Director is authorized to charge any additional fees during pendency of this application, including any required extension of time fees, or credit any overpayment to Deposit Account Number 20-1430. This paragraph is intended to be a constructive petition for extension of time in accordance with 37 C.F.R. § 1.136(a)(3).

If the Examiner believes a telephone conference would expedite prosecution of this application, please contact the undersigned at (650) 326-2400 or kcatmull@kilpatricktownsend.com.

Respectfully submitted,

/Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

KBC:vmg

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. – 9. (Canceled)

10. A system for transporting wireless communications, comprising:

a baseband unit;

a plurality of signal sources, including at least a first signal source and a second signal source;

a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and

wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.

11. The system of claim 10 wherein the baseband unit is configured to packetize each digital representation of a radio resource.

12. The system of claim 10 wherein the baseband unit is configured to packetize each digital representation of a radio resource in compliance with the Common Public Radio Interface (CPRI) standard.

13. The system of claim 10 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.

14. The system of claim 10 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

15. The system of claim 10 wherein the baseband unit and at least one of the plurality of signal sources are part of a baseband controller.

16. The system of claim 10 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

17. The system of claim 16 wherein the one or more additional baseband units includes a plurality of additional baseband units, and the baseband unit is connected to at least a first one of the plurality of additional baseband units through a direct connection and at least a second one of the plurality of additional baseband units through an indirect connection.

18. A baseband controller for use in the transport of wireless communications, comprising:

a plurality of interfaces to communicatively couple a baseband unit to a plurality of signal sources, including at least a first signal source and a second signal source;

at least one interface to communicatively couple the baseband unit to a plurality of remote units, including at least a first remote unit;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send digital representations of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send digital representations of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit; and

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.

19. The baseband controller of claim 18 wherein the baseband unit is configured to packetize each digital representation of a radio resource.

20. The baseband controller of claim 18 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.

21. The baseband controller of claim 18 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

22. The baseband controller of claim 18 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

23. The baseband controller of claim 18 wherein the plurality of radio resources include a first composite signal from the first signal source and a second composite signal from the second signal source, and the baseband unit is configured to form the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

24. A method for providing digital signals in a Distributed Antenna System (DAS), comprising:

receiving at a baseband unit, from a plurality of signal sources including at least a first signal source and a second signal source, a plurality of radio resources;

transmitting from the baseband unit, at a first point in time, a digital representation of a first set of radio resources to a first remote unit, the first set of radio resources for transmission at an antenna of the first remote unit;

transmitting from the baseband unit, at a second point in time, a digital representation of a second set of radio resources to the first remote unit, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.

25. The method of claim 24 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the second remote unit.

26. The method of claim 24 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

27. The method of claim 24 further comprising receiving at the baseband unit, from at least one additional baseband unit, a second plurality of radio resources.

28. The method of claim 24 wherein the plurality of radio resources include a first composite signal from the first signal source and a second composite signal from the second signal source, the method further comprising forming, at the baseband unit, the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

29. The method of claim 24 further comprising packetizing, at the baseband unit, at least a subset of the plurality of radio resources.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on February 11, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton et al.	Examiner: Wei Zhao
Application No.: 16/059,434	Technology Center/Art Unit: 2473
Filed: August 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	**PRELIMINARY AMENDMENT**
Customer No.: 20350	

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

Commissioner:

Prior to examination of the above-referenced application, please enter the following amendments and consider the following remarks:

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

Remarks/Arguments begin on page 7 of this paper.

Electronic Acknowledgement Receipt	
EFS ID:	35118625
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull/Vanessa Aguilar
Filer Authorized By:	Kelvin B. Catmull
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	11-FEB-2019
Filing Date:	09-AUG-2018
Time Stamp:	18:04:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Preliminary_Amendment_091172-1100459.pdf	92210 d3f6633c375ccf9bc7405f528a28b63f9d76e0cf	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	7	7
	Claims	2	6
	Preliminary Amendment	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	92210	

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.

REMARKS/ARGUMENTS

Upon entry of the present amendment, claims 10-29 will be pending in this application. Claims 1-9 been canceled, and new claims 10-29 have been added. No new matter is added.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this application are in condition for examination.

Except for the issue fees payable under 37 C.F.R. § 1.18, the Director is authorized to charge any additional fees during pendency of this application, including any required extension of time fees, or credit any overpayment to Deposit Account Number 20-1430. This paragraph is intended to be a constructive petition for extension of time in accordance with 37 C.F.R. § 1.136(a)(3).

If the Examiner believes a telephone conference would expedite prosecution of this application, please contact the undersigned at (650) 326-2400 or kcatmull@kilpatricktownsend.com.

Respectfully submitted,

/Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

KBC:vmg

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. – 9. (Canceled)

10. (New) A system for transporting wireless communications, comprising:

a baseband unit;

a plurality of signal sources, including at least a first signal source and a second signal source;

a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and

wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.

11. (New) The system of claim 10 wherein the baseband unit is configured to packetize each digital representation of a radio resource.

12. (New) The system of claim 10 wherein the baseband unit is configured to packetize each digital representation of a radio resource in compliance with the Common Public Radio Interface (CPRI) standard.

13. (New) The system of claim 10 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.

14. (New) The system of claim 10 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

15. (New) The system of claim 10 wherein the baseband unit and at least one of the plurality of signal sources are part of a baseband controller.

16. (New) The system of claim 10 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

17. (New) The system of claim 16 wherein the one or more additional baseband units includes a plurality of additional baseband units, and the baseband unit is connected to at least a first one of the plurality of additional baseband units through a direct connection and at least a second one of the plurality of additional baseband units through an indirect connection.

18. (New) A baseband controller for use in the transport of wireless communications, comprising:

a plurality of interfaces to communicatively couple a baseband unit to a plurality of signal sources, including at least a first signal source and a second signal source;

at least one interface to communicatively couple the baseband unit to a plurality of remote units, including at least a first remote unit;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send digital representations of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send digital representations of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit; and

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.

19. (New) The baseband controller of claim 18 wherein the baseband unit is configured to packetize each digital representation of a radio resource.

20. (New) The baseband controller of claim 18 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.

21. (New) The baseband controller of claim 18 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

22. (New) The baseband controller of claim 18 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

23. (New) The baseband controller of claim 18 wherein the plurality of radio resources include a first composite signal from the first signal source and a second composite signal from the second signal source, and the baseband unit is configured to form the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

24. (New) A method for providing digital signals in a Distributed Antenna System (DAS), comprising:

receiving at a baseband unit, from a plurality of signal sources including at least a first signal source and a second signal source, a plurality of radio resources;

transmitting from the baseband unit, at a first point in time, a digital representation of a first set of radio resources to a first remote unit, the first set of radio resources for transmission at an antenna of the first remote unit;

transmitting from the baseband unit, at a second point in time, a digital representation of a second set of radio resources to the first remote unit, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.

25. (New) The method of claim 24 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the second remote unit.

26. (New) The method of claim 24 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

27. (New) The method of claim 24 further comprising receiving at the baseband unit, from at least one additional baseband unit, a second plurality of radio resources.

28. (New) The method of claim 24 wherein the plurality of radio resources include a first composite signal from the first signal source and a second composite signal from the second signal source, the method further comprising forming, at the baseband unit, the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

29. (New) The method of claim 24 further comprising packetizing, at the baseband unit, at least a subset of the plurality of radio resources.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/059,434	Filing Date 08/09/2018	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	02/11/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $230 =	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 $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/CAROL A BARNES/
*** 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.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on February 13, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton	Examiner: Wei Zhao
Application No.: 16/059,434	Technology Center/Art Unit: 2473
Filed: Aug 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	STATEMENT OF SUBSTANCE OF INTERVIEW
Customer No.: 20350	

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

Commissioner:

The undersigned thanks Examiner Zhao for the helpful telephone interview conducted on February 4, 2019. During the interview, the preliminary amendment filed January 7, 2019 was discussed. No specific agreement regarding the pending claims was reached.

If the Examiner believes a telephone conference would expedite prosecution of this application, please contact the undersigned at (650) 326-2400 or kcatmull@kilpatricktownsend.com.

Respectfully submitted,

/Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

Electronic Acknowledgement Receipt	
EFS ID:	35144421
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull/Vanessa Aguilar
Filer Authorized By:	Kelvin B. Catmull
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	13-FEB-2019
Filing Date:	09-AUG-2018
Time Stamp:	19:51:11
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	Applicant summary of interview with examiner	Statement_Of_Substance_Interview_091172-1100459.pdf	71963 1de4cb49c42cd0449173edbae19907515cc0919e	no	1

Warnings:

Information:	
Total Files Size (in bytes):	71963

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

20350 7590 02/21/2019

KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

EXAMINER	
ZHAO, WEI	

ART UNIT	PAPER NUMBER
2473	

NOTIFICATION DATE	DELIVERY MODE
02/21/2019	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):

KTSDocketing2@kilpatrick.foundationip.com
ipefiling@kilpatricktownsend.com

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No. 16/059,434	Applicant(s) Stapleton et al.	
	Examiner WEI ZHAO	Art Unit 2473	AIA Status No

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 8/9/2018.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 10-29 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) 10-12,18-19,24 and 29 is/are rejected.

8) ☑ Claim(s) 13-17,20-23 and 25-28 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 8/9/2018 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

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

Priority

2. Acknowledgment is made of this is a continuation of U.S. Patent Application No. 15/223,819 filed July 29, 2016, now US 10,080,178, which is a continuation of U.S. Patent Application No. 14/800,515 filed July 15, 2015, now US 9,419,837, which is a continuation of U.S. Patent Application No. 14/260,145 filed April 23, 2014, now US 9,137,078, which is a continuation of U.S. Patent Application No. 13/211,247 filed August 16, 2011, now US 8,737,300, which claims the benefit of U.S. Provisional Patent Application No. 61/439,940, filed February 7, 2011.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on August 9, 2018 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The term "Common Public Interface Standard (CPRI)" is used in paragraph [0056]. It is suggested amending the term to "Common Public Interface Standard (CPIS)," since the acronym "CPRI" is commonly used for "Common Public Radio Interface".

Claim Rejections - 35 USC § 112

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

> 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.

6. Claim 12 rejected under 35 U.S.C. 112(b).

Regarding claim 12, it recites the Common Public Radio Interface standard without reference to a specific edition and/or publication date for the particular standard. Since the underlying standard may change over time, the scope of the claim(s) may also change over time which renders the claim(s) indefinite.

Applicant may overcome this rejection by amending the claim(s) to include a specific edition and/or publication date of the particular claimed standard.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory

obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claim 10 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 10 of U.S. Patent No. 10,080,178.

Regarding claim 10, it recites, “A system for transporting wireless communications, comprising:

a baseband unit;

a plurality of signal sources, including at least a first signal source and a second signal source;

a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and

wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units."

Claim 10 of U.S. Patent No. 10,080,178 recites, "A system for transporting wireless communications, comprising:

a host unit;

a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the host unit comprises at least one interface to communicatively couple the host unit to at least one signal source;

wherein the host unit is configured to receive a plurality of downlink channel signals from the at least one signal source;

wherein the host unit is configured to send digital representations of the plurality of downlink channel signals to the plurality of remote units;

wherein the host unit is configurable to send digital representations of a first set of downlink channel signals to the first remote unit at a first point in time, the first set of downlink channel signals for transmission at an antenna of the first remote unit;

wherein the host unit is configurable to send digital representations of a second set of downlink channel signals to the first remote unit at a second point in time, the second set of downlink channel signals for transmission at the antenna of the first remote unit;

wherein a number of downlink channel signals in the first set of downlink channel signals is different from a number of downlink channel signals in the second set of downlink channel signals; and

wherein the host unit is configured to receive digital signals from each of the plurality of remote units."

Based on the limitations presented above, claim 10 of the instant application claims similar elements in claim 10 of U.S. Patent No. 10,080,178, by using different wordings, such as using "a baseband unit" instead of "a host unit." Therefore, claim 10 of the instant application would be obvious to one skilled in the art based on claim 10 of the patent.

The same rationale applies to claims 11, 18, 19, 24, and 29 as follows:

9. Claim 11 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 11 of U.S. Patent No. 10,080,178.

10. Claim 18 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 10,080,178.

11. Claim 19 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 9 of U.S. Patent No. 10,080,178.

12. Claim 24 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 15 of U.S. Patent No. 10,080,178.

13. Claim 29 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 19 of U.S. Patent No. 10,080,178.

Allowable Subject Matter

14. Claims 10-29 would be allowable if the rejections under 35 U.S.C. 112(b) and double patenting overcome. The following is the reason for examiner's statement of allowance:

The closest prior art on record, Sulzberger et al. (US 2005/0152695) and Boldi et al. (US 8,855,489) are generally directed to various aspects of the radio base station with multiple radio frequency heads; and the communications method between a main station and processing nodes includes interconnecting the main station and the nodes in an optical path defining adjacent nodes and non-adjacent nodes.

However, in consideration of the information disclosure statement submitted August 9, 2018 and further search, no prior art reference or a combination of prior art references disclose or suggest the combination of limitations specified in the independent claims including:

"wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;" and "wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources," in claim 10.

Claim 18 includes similar limitations.

"transmitting from the baseband unit, at a second point in time, a digital representation of a second set of radio resources to the first remote unit, the second set of radio resources for transmission at the antenna of the first remote unit;" and "wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources," in claim 24.

Dependent claims 11-17, 19-23, and 25-29 are also allowable for incorporating the features recited in the independent claims.

Conclusion

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

Sulzberger et al. (US 2005/0152695) is generally directed to various aspects of the radio base station with multiple radio frequency heads;

Boldi et al. (US 8,855,489) is directed to the communications method between a main station and processing nodes includes interconnecting the main station and the nodes in an optical path defining adjacent nodes and non-adjacent nodes;

Callard et al. (US 2009/0060088) is cited to show a method for detecting the number of transmit antennas in a base station.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WEI ZHAO whose telephone number is (571)270-5672. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang B. Yao can be reached on 5712723182. 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.

/WEI ZHAO/
Primary Examiner, Art Unit 2473

Notice of References Cited	Application/Control No. 16/059,434	Applicant(s)/Patent Under Reexamination Stapleton et al.	
	Examiner WEI ZHAO	Art Unit 2473	Page 1 of 1

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*	C	US-20090060088-A1	03-2009	Callard; Aaron	H04B7/0689	375/299
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/059,434	Stapleton et al.
	Examiner	**Art Unit**
	WEI ZHAO	2473

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

CLAIMS

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

CLAIM		DATE								
Final	Original	02/16/2019								
	1	-								
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	23	O								
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	25	O								
	26	O								
	27	O								
	28	O								
	29	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/059,434	Stapleton et al.
	Examiner	Art Unit
	WEI ZHAO	2473

CPC - Searched*		
Symbol	Date	Examiner
H04W24/04, 40/02	02/14/2019	wz
H04L25/03; H04B1/0475, 7/022	02/14/2019	wz

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
searched in pgpub, uspat, ieee xplore, ip.com	02/14/2019	wz
inventor search	02/14/2019	wz
fmid search	02/14/2019	wz
odp search in palm resource center	02/15/2019	wz

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
H04W	24/04	02/15/2019	wz

/WEI ZHAO/ Primary Examiner, Art Unit 2473	

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Date: 2/16/2019
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Inventor Name Search Result

Your Search was:

Last Name = STAPLETON
First Name = SHAWN

Application#	Patent#	PG Pub#	Status	Date Filed	Title	Examiner Name	Inventor Name
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Inventor Search Completed: No Records to Display.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code [1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

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	Filing Date	Herewith
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	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

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	259.	Notice of Allowance for U.S. Patent Application No. 15/223,819 mailed on February 1, 2018, 9 pages.	
	260.	Office Action for Chinese Patent Application No. 201610011597.9, mailed March 29, 2018, 5 pages	
	261.	Notice of Allowance for U.S. Patent Application No. 15/223,819 mailed on June 5, 2018, 7 pages.	

EXAMINER SIGNATURE			
Examiner Signature /WEI ZHAO/		Date Considered 02/15/2019	

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

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.Z/

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

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Kelvin B. Catmull/	Date (YYYY-MM-DD)	2018-08-09
Name/Print	Kelvin B. Catmull	Registration Number	57,535

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.Z/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S10885	20	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) and (BGP or (border with (GW$1 or gateway$1))) same (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	USPAT	OR	OFF	2019/02/14 08:16
S10886	29	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) and (BGP or (border with (GW$1 or gateway$1))) same (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/14 08:27
S10889	26	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) and (BGP or (border with (GW$1 or gateway$1))) with (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/14 09:46
S10890	1	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) same (BGP or (border with (GW$1 or gateway$1))) with (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/14 10:12
S10892	1	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) same (BGP or (border with (GW$1 or gateway$1))) same (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/14 10:23
S10893	3	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) same (BGP or (border with (GW$1 or gateway$1))) and (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/14 10:23
S10894	6	(SDN or (software-defined with network$3) or software-defined) and obtain$3 same control$4 with	US-PGPUB; USPAT; USOCR;	OR	OFF	2019/02/14 15:49

		(signal$3 or messag$3 or data or packet$1) same (BGP or (border with (GW$1 or gateway$1))) and (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S10895	9	(SDN or (software-defined with network$3) or software-defined) with control$4 same (signal$3 or messag$3 or data or packet$1) and virtual with private with wire$1	USPAT	OR	OFF	2019/02/15 08:39
S10896	11	(SDN or (software-defined with network$3) or software-defined) with control$4 and (signal$3 or messag$3 or data or packet$1) same virtual with private with wire$1	USPAT	OR	OFF	2019/02/15 08:52
S10897	27	(SDN or (software-defined with network$3) or software-defined) with control$4 and (signal$3 or messag$3 or data or packet$1) same virtual with private with wire$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/15 08:53
S10898	8	((("Dali") near3 ("Wireless") near3 ("Inc"))).AS,AANM.	USPAT	OR	OFF	2019/02/15 10:23
S10899	1246	((("STAPLETON") near3 ("Shawn")) OR (("LEMSON") near3 ("Paul")) OR (("LIN") near3 ("Bin")) OR (("LEE") near3 ("Albert"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/02/15 10:26
S10900	6	S10898 and S10899	USPAT	OR	OFF	2019/02/15 10:31
S10901	38	number with radio with (resource$1 or signal$1) same digital with representation	USPAT	OR	OFF	2019/02/15 11:27
S10902	402	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1)	USPAT	OR	OFF	2019/02/15 11:28
S10903	75	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and baseband$1 with (unit$1 or device$1 or equipment)	USPAT	OR	OFF	2019/02/15 11:28
S10904	62	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and remot$3 same baseband$1 with (unit$1 or device$1 or equipment)	USPAT	OR	OFF	2019/02/15 11:37
S10915	49	((("Dali") near3 ("Wireless") near3 ("Inc"))).AS,AANM.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/15 11:42
S10916	12	((("Dali") near3 ("Wireless") near3 ("Inc"))).AS,AANM. and baseband$1	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2019/02/15 11:43

			JPO; DERWENT; IBM_TDB			
S10917	8	((("Dali") near3 ("Wireless") near3 ("Inc"))).AS,AANM. and baseband$1 and remot$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/15 11:43
S10923	33	"39563020".fmid.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/15 14:04
S10924	1246	((("STAPLETON") near3 ("Shawn")) OR (("LEMSON") near3 ("Paul")) OR (("LIN") near3 ("Bin")) OR (("LEE") near3 ("Albert"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/02/16 14:20
S10925	1246	((("STAPLETON") near3 ("Shawn")) OR (("LEMSON") near3 ("Paul")) OR (("LIN") near3 ("Bin")) OR (("LEE") near3 ("Albert"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/02/16 14:20
S10926	74272	distribut$3 with antenna$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2019/02/16 14:22
S10927	9	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04W24/$.cpc.	USPAT	OR	OFF	2019/02/16 14:24
S10928	25	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04W24/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:24
S10929	139	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04W24/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:25
S10930	124	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04W24/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:26
S10931	12	number with radio with (resource$1	US-PGPUB;	OR	OFF	2019/02/16

		or signal$1) and digital with (representation or identification$1 or ID$1) and H04W24/04$.cpc.	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			14:26
S10932	69	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04W40/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:26
S10933	40	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04W40/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:26
S10934	32	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04W40/02$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:26
S10935	83	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04L25/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:27
S10936	75	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04L25/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:27
S10937	51	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04L25/03$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:27
S10938	1	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04L25/03$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:27
S10939	86	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04B1/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2019/02/16 14:28

			IBM_TDB			
S10940	2	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04B1/04$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:28
S10941	13	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04B1/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:28
S10942	82	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04B7/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:28
S10943	61	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04B7/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:29
S10945	10	number with radio with (resource$1 or signal$1) and digital with (representation or identification$1 or ID$1) and H04B7/02$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:29
S10946	21	"10080178"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:30
S10947	1	"10080178" and S10924	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/02/16 14:30

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	33	number with radio with (resource$1 or signal$1) same digital with (representation or identification$1 or ID$1) and H04B7/0$.cpc.	USPAT	OR	OFF	2019/02/16 15:55
S10887	6	(SDN or (software-defined with network$3)	USPAT	OR	OFF	2019/02/14

		or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) and (BGP or (border with (GW$1 or gateway$1))) same (VPN$1 or (virtual with private with network$3)) and H04L45/64$.cpc.				08:15
S10888	20	(SDN or (software-defined with network$3) or software-defined) and obtain$3 with control$4 with (signal$3 or messag$3 or data or packet$1) and (BGP or (border with (GW$1 or gateway$1))) same (VPN$1 or (virtual with private with network$3)) and H04L45/6$.cpc.	USPAT	OR	OFF	2019/02/14 08:15
S10918	9	(SDN or (software-defined with network$3) or software-defined) with control$4 same (signal$3 or messag$3 or data or packet$1) and virtual with private with wire$1	USPAT	OR	OFF	2019/02/15 08:40
S10919	24	(SDN or (software-defined with network$3) or software-defined) with control$4 same (signal$3 or messag$3 or data or packet$1) and virtual with private with wire$1	US-PGPUB; USPAT	OR	OFF	2019/02/15 08:40
S10920	3	(SDN or (software-defined with network$3) or software-defined) with control$4 same (signal$3 or messag$3 or data or packet$1) same virtual with private with wire$1	US-PGPUB; USPAT	OR	OFF	2019/02/15 08:41
S10921	27	(SDN or (software-defined with network$3) or software-defined) with control$4 and (signal$3 or messag$3 or data or packet$1) same virtual with private with wire$1	US-PGPUB; USPAT	OR	OFF	2019/02/15 08:52
S10922	34	(SDN or (software-defined with network$3) or software-defined) and control$4 with (signal$3 or messag$3 or data or packet$1) and virtual with private with wire$1	USPAT	OR	OFF	2019/02/15 09:41

2/16/2019 4:00:46 PM
C:\Users\wzhao\Documents\EAST\Workspaces\temp.wsp

Bibliographic Data

Application No: 16/059,434

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /WEI ZHAO/ (Examiner's Signature) | (Initials)

Title: DISTRIBUTED ANTENNA SYSTEM

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/09/2018	370	2473	091172-1100459-102450US
RULE			

APPLICANTS

Dali Wireless, Inc., Menlo Park, CA,

INVENTORS

Shawn Patrick Stapleton Vancouver, CANADA

Paul Lemson Woodinville, WA, UNITED STATES

Bin Lin Burnaby, CANADA

Albert S. Lee San Mateo, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 15223819 07/29/2016 PAT 10080178

15223819 is a CON of 14800515 07/15/2015 PAT 9419837

14800515 is a CON of 14260145 04/23/2014 PAT 9137078

14260145 is a CON of 13211247 08/16/2011 PAT 8737300

13211247 has PRO of 61439940 02/07/2011

FOREIGN APPLICATIONS

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08/27/2018

** SMALL ENTITY **

STATE OR COUNTRY

CANADA

ADDRESS

KILPATRICK TOWNSEND & STOCKTON LLP

Mailstop: IP Docketing - 22

1100 Peachtree Street

Suite 2800

Atlanta, GA 30309
UNITED STATES

FILING FEE RECEIVED

$1,165

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/059,434
	Filing Date	August 9, 2018
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	2473
	Examiner Name	Wei Zhao
	Attorney Docket Number	091172-1100459-102450US

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code [1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code [1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

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

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	Patent Owner's Preliminary Response filed in IPR2018-00571, dated May 16, 2018. 66 pages.	
	2.	Decision for Institution of *Inter Partes* Review for IPR2018-00571, dated August 14, 2018. 41 pages.	
	3.	Patent Owner's Response filed in IPR2018-00571, dated October 26, 2018. 69 pages.	
	4.	Declaration of Harry V. Bims, Ph.D. (Exhibit 2007) filed in IPR2018-00571, dated October 26, 2018. 94 pages.	
	5.	Petitioner's Reply filed in IPR2018-00571, dated January 11, 2019. 30 pages.	
	6.	Declaration of De. Anthony Acampora (Exhibit 1047) filed in IPR2018-00571, dated January 11, 2019. 21 pages.	
	7.	Patent Owner's Sur-Reply filed in IPR2018-00571, dated February 8, 2019. 31 pages.	

EXAMINER SIGNATURE

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/059,434
	Filing Date	August 9, 2018
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	2473
	Examiner Name	Wei Zhao
	Attorney Docket Number	091172-1100459-102450US

Examiner Signature		Date Considered	

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

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

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on March 12, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Christine Rogers/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton	Examiner: Wei Zhao
Application No.: 16/059,434	Technology Center/Art Unit: 2473
Filed: August 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
Customer No.: 20350	

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

Commissioner:

The references cited on attached form PTO/SB/08A are being called to the attention of the Examiner. In accordance with the provisions of 37 CFR §1.98(a)(2), copies of any cited U.S. Patent and U.S. Patent Application Publications are not provided. Copies of the remaining cited references are provided.

It is respectfully requested that the cited references be expressly considered during the prosecution of this application, and the references be made of record therein and appear among the "references cited" on any patent to issue therefrom.

As provided for by 37 CFR §1.97(g) and (h), no inference should be made that the information and references cited are prior art merely because they are in this statement and no representation is being made that a search has been conducted or that this statement encompasses all the possible relevant information.

This Information Disclosure Statement is being filed after the mailing of the first Office Action on the merits, but before the mailing date of the final Office Action, Notice of Allowance, or any other action that closes prosecution.

The Commissioner is authorized to charge the fee set forth in §1.17(p) to the firm's credit card for consideration of this paper. The Commissioner is authorized to charge any additional fee due to Deposit Account No. 20-1430.

Respectfully submitted,

/Kelvin B. Catmull/

Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

Attachment

Electronic Patent Application Fee Transmittal					
Application Number:	16059434				
Filing Date:	09-Aug-2018				
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM				
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton				
Filer:	Kelvin B. Catmull/Christine Rogers				
Attorney Docket Number:	091172-1100459-102450US				
Filed as Small Entity					
Filing Fees for **Utility under 35 USC 111(a)**					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**120**

Electronic Acknowledgement Receipt	
EFS ID:	35402902
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull/Christine Rogers
Filer Authorized By:	Kelvin B. Catmull
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	12-MAR-2019
Filing Date:	09-AUG-2018
Time Stamp:	19:05:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$120
RAM confirmation Number	031319INTEFSW19060500
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20190312_FWR_SIDS_091172-1100459.pdf	198519 64495bddf9a516578007b08d3be39bad58587ed6	yes	4
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Information Disclosure Statement (IDS) Form (SB08)		3	4	
	Transmittal Letter		1	2	
Warnings:					
Information:					
2	Non Patent Literature	20190312_FWR_NPL1_091172-1100459.pdf	4130247 29486face77213b65d82e362819ff99236a03e45	no	66
Warnings:					
Information:					
3	Non Patent Literature	20190312_FWR_NPL2_091172-1100459.pdf	2593187 6baad7f5ce9bce312145273180d510fbebd8e4c4	no	41
Warnings:					
Information:					
4	Non Patent Literature	20190312_FWR_NPL3_091172-1100459.pdf	4070215 419fb63156b7edd8bfee33423af8283ed8be82a8	no	69
Warnings:					
Information:					
5	Non Patent Literature	20190312_FWR_NPL4_091172-1100459.pdf	6957037 6343a52390bf383506db7dda1252f355e551d01d	no	94
Warnings:					
Information:					

6	Non Patent Literature	20190312_FWR_NPL5_091172-1100459.pdf	1395897 37b7e7201cc46c98c32c8404b5488d3792d891ef	no	30
Warnings:					
Information:					
7	Non Patent Literature	20190312_FWR_NPL6_091172-1100459.pdf	4765215 86296f65a37d42ba82746e29cb590cc9ee8189bc	no	21
Warnings:					
Information:					
8	Non Patent Literature	20190312_FWR_NPL7_091172-1100459.pdf	1603774 7fa63038204efc80854a0437a5fddca00d88a429	no	31
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	30689 a815060d4fc2ab05f49d196c2c730857605feab9	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	25744780		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

20350
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

PUBLICATION NOTICE



Title:DISTRIBUTED ANTENNA SYSTEM

Publication No.US-2019-0110239-A1
Publication Date:04/11/2019

NOTICE OF PUBLICATION OF APPLICATION

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

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

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

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

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

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

Doc Code: DIST.E.FILE **Document Description: Electronic Terminal Disclaimer - Filed**	PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	16059434
Filing Date	09-Aug-2018
First Named Inventor	Shawn Stapleton
Attorney Docket Number	091172-1100459-102450US
Title of Invention	DISTRIBUTED ANTENNA SYSTEM

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

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

Owner	Percent Interest
Dali Wireless, Inc.	100%

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

10080178

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

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

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.	
Applicant claims the following fee status: ◉ Small Entity ○ Micro Entity ○ Regular Undiscounted I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application Registration Number 57535 ○ A sole inventor ○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ○ A joint inventor; all of whom are signing this request	
Signature	/Kelvin B. Catmull/
Name	Kelvin B. Catmull

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

Electronic Patent Application Fee Transmittal	
Application Number:	16059434
Filing Date:	09-Aug-2018
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Filer:	Kelvin B. Catmull
Attorney Docket Number:	091172-1100459-102450US
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

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

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

Application No.: 16059434

Filing Date: 09-Aug-2018

Applicant/Patent under Reexamination: Stapleton

Electronic Terminal Disclaimer filed on April 17, 2019

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

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

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	35741503
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull
Filer Authorized By:	
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	17-APR-2019
Filing Date:	09-AUG-2018
Time Stamp:	14:48:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$160
RAM confirmation Number	041819INTEFSW14483000
Deposit Account	201430
Authorized User	Kelvin Catmull
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 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	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	33508 bd0d3e0baf19ae4ceab4e64c26336852648 9092d	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30701 f21805439abbaa0905d4962cad085f024ba 2a374	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	64209		

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.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on April 18, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Shawn Patrick Stapleton et al.
Application No.: 16/059,434
Filed: August 9, 2018
For: DISTRIBUTED ANTENNA SYSTEM
Customer No.: 20350

Confirmation No.: 2049
Examiner: Wei Zhao
Technology Center/Art Unit: 2473

AMENDMENT / RESPONSE TO OFFICE ACTION

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

Commissioner:

In response to the Office Action mailed February 21, 2019, please enter the following amendments and consider the following remarks:

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

Remarks/Arguments begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. – 9. (Canceled)

10. (Previously Presented) A system for transporting wireless communications, comprising:

a baseband unit;

a plurality of signal sources, including at least a first signal source and a second signal source;

a plurality of remote units, including at least a first remote unit and a second remote unit;

wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and

wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.

11. (Previously Presented) The system of claim 10 wherein the baseband unit is configured to packetize each digital representation of a radio resource.

12. (Canceled)

13. (Previously Presented) The system of claim 10 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.

14. (Previously Presented) The system of claim 10 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

15. (Previously Presented) The system of claim 10 wherein the baseband unit and at least one of the plurality of signal sources are part of a baseband controller.

16. (Previously Presented) The system of claim 10 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

17. (Previously Presented) The system of claim 16 wherein the one or more additional baseband units includes a plurality of additional baseband units, and the baseband unit is connected to at least a first one of the plurality of additional baseband units through a direct connection and at least a second one of the plurality of additional baseband units through an indirect connection.

18. (Previously Presented) A baseband controller for use in the transport of wireless communications, comprising:

a plurality of interfaces to communicatively couple a baseband unit to a plurality of signal sources, including at least a first signal source and a second signal source;

at least one interface to communicatively couple the baseband unit to a plurality of remote units, including at least a first remote unit;

wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

wherein the baseband unit is configured to send digital representations of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

wherein the baseband unit is configured to send digital representations of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit; and

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.

19. (Previously Presented) The baseband controller of claim 18 wherein the baseband unit is configured to packetize each digital representation of a radio resource.

20. (Previously Presented) The baseband controller of claim 18 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.

21. (Previously Presented) The baseband controller of claim 18 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

22. (Previously Presented) The baseband controller of claim 18 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

23. (Previously Presented) The baseband controller of claim 18 wherein the plurality of radio resources include a first composite signal from the first signal source and a

second composite signal from the second signal source, and the baseband unit is configured to form the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

24. (Previously Presented) A method for providing digital signals in a Distributed Antenna System (DAS), comprising:

receiving at a baseband unit, from a plurality of signal sources including at least a first signal source and a second signal source, a plurality of radio resources;

transmitting from the baseband unit, at a first point in time, a digital representation of a first set of radio resources to a first remote unit, the first set of radio resources for transmission at an antenna of the first remote unit;

transmitting from the baseband unit, at a second point in time, a digital representation of a second set of radio resources to the first remote unit, the second set of radio resources for transmission at the antenna of the first remote unit;

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.

25. (Previously Presented) The method of claim 24 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the second remote unit.

26. (Previously Presented) The method of claim 24 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.

27. (Previously Presented) The method of claim 24 further comprising receiving at the baseband unit, from at least one additional baseband unit, a second plurality of radio resources.

28. (Previously Presented) The method of claim 24 wherein the plurality of radio resources include a first composite signal from the first signal source and a second composite signal from the second signal source, the method further comprising forming, at the baseband unit, the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

29. (Previously Presented) The method of claim 24 further comprising packetizing, at the baseband unit, at least a subset of the plurality of radio resources.

REMARKS/ARGUMENTS

Claims 10-11 and 13-29 are pending in this application. Claims 1-9 and 12 have been canceled. No new matter is added.

Based on the following remarks, Applicant respectfully requests reconsideration and allowance of the pending claims.

OFFICE ACTION SUMMARY

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter.

Claim 12 is rejected under 35 U.S.C. §112(b) as being indefinite.

Claims 10-11, 18-19, 24, and 29 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over various claims of U.S. Patent No. 10,080,178.

Claims 10-29 are indicated as being allowable if the above rejections are overcome. The undersigned thanks the Examiner for the indication of allowable subject matter.

OBJECTION TO SPECIFICATION

Claim 12 has been canceled and thus the objection to the Specification is moot.

REJECTION UNDER 35 U.S.C. § 112

Claim 12 has been canceled and thus the rejection under 35 U.S.C. § 112 is moot.

DOUBLE PATENTING REJECTIONS

Without acquiescing to the propriety of the double patenting rejections, an electronic Terminal Disclaimer (eTD) has been filed to overcome the rejections and expedite examination of this application.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

Except for the issue fees payable under 37 C.F.R. § 1.18, the Director is authorized to charge any additional fees during pendency of this application, including any required extension of time fees, or credit any overpayment to Deposit Account Number 20-1430. This paragraph is intended to be a constructive petition for extension of time in accordance with 37 C.F.R. § 1.136(a)(3).

If the Examiner believes a telephone conference would expedite prosecution of this application, please contact the undersigned at (650) 326-2400 or kcatmull@kilpatricktownsend.com.

Respectfully submitted,

/Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on April 18, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton	Examiner: Wei Zhao
Application No.: 16/059,434	Technology Center/Art Unit: 2473
Filed: August 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	**SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT**
Customer No.: 20350	

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

Commissioner:

The references cited on attached form PTO/SB/08A are being called to the attention of the Examiner. In accordance with the provisions of 37 CFR §1.98(a)(2), copies of any cited U.S. Patents and U.S. Patent Application Publications are not provided. Copies of the remaining cited references are provided.

It is respectfully requested that the cited references be expressly considered during the prosecution of this application, and the references be made of record therein and appear among the "references cited" on any patent to issue therefrom.

As provided for by 37 CFR §1.97(g) and (h), no inference should be made that the information and references cited are prior art merely because they are in this statement and no

representation is being made that a search has been conducted or that this statement encompasses all the possible relevant information.

This Information Disclosure Statement is being filed after the mailing of the first Office Action on the merits, but before the mailing date of the final Office Action, Notice of Allowance, or any other action that closes prosecution.

The Commissioner is authorized to charge the fee set forth in §1.17(p) to the firm's credit card for consideration of this paper. The Commissioner is authorized to charge any additional fee due to Deposit Account No. 20-1430.

Respectfully submitted,

/Kelvin B. Catmull/

Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

Attachment

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/059,434
	Filing Date	August 9, 2018
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	2473
	Examiner Name	Wei Zhao
	Attorney Docket Number	091172-1100459-102450US

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code [1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code [1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

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

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	European Patent Application No. 11818695.6, Office Action mailed March 20, 2019, 6 pages.	
	2.	Patent Owner's Preliminary Response filed in IPR2018-00571, dated May 16, 2018, 66 pages.	
	3.	Decision for Institution of Inter Partes Review for IPR2018-00571, dated August 14, 2018, 41 pages.	
	4.	Patent Owner's Response filed in IPR2018-00571, dated October 26, 2018, 69 pages.	
	5.	Declaration of Harry V. Bims, Ph.D. (Exhibit 2007) filed in IPR2018-00571, dated October 26, 2018, 94 pages.	
	6.	Petitioner's Reply filed in IPR2018-00571, dated January 11, 2019, 30 pages.	
	7.	Declaration of Dr. Anthony Acampora (Exhibit 1047) filed in IPR2018-00571, dated January 11, 2019, 21 pages.	
	8.	Patent Owner's Sur-Reply filed in IPR2018-00571, dated February 8, 2019, 31 pages.	

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/059,434
	Filing Date	August 9, 2018
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	2473
	Examiner Name	Wei Zhao
	Attorney Docket Number	091172-1100459-102450US

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

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

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

Electronic Patent Application Fee Transmittal					
Application Number:	16059434				
Filing Date:	09-Aug-2018				
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM				
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton				
Filer:	Kelvin B. Catmull/Vanessa Aguilar				
Attorney Docket Number:	091172-1100459-102450US				
Filed as Small Entity					
Filing Fees for Utility under 35 USC 111(a)					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**120**

Electronic Acknowledgement Receipt	
EFS ID:	35765249
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull
Filer Authorized By:	
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	18-APR-2019
Filing Date:	09-AUG-2018
Time Stamp:	14:43:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$120
RAM confirmation Number	041919INTEFSW14443200
Deposit Account	201430
Authorized User	Kelvin Catmull
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 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		Amendment_091172-1100459.pdf	98888 c1f36b1daf053a514e13ed95cc0cc3ef82e113ef	yes	8
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
	Claims		2	6	
	Applicant Arguments/Remarks Made in an Amendment		7	8	
Warnings:					
Information:					
2	Non Patent Literature	NPL_EP_11818695-6_OA_03202019.pdf	4957283 57fff1ff8c3996b48daa9a75101a95243535edcc	no	6
Warnings:					
Information:					
3	Non Patent Literature	NPL_Patent_Owners_Preliminary_Response_2018.pdf	2389885 df477e41406f56dbff892ffa5c4131959faa140b	no	66
Warnings:					
Information:					
4	Non Patent Literature	NPL_Decision_for_Institution_of_Inter_Partes_Review_2018.pdf	1743245 fb11964f2bdd4a3829a3c9791994772f05ede333	no	41
Warnings:					
Information:					
5	Non Patent Literature	NPL_Patent_Owner_Response_2018.pdf	2516862 d9f86fac72ee786885f212e1bab605d6652673c2	no	69

Warnings:					
Information:					
6	Non Patent Literature	NPL_Declaration_Harry_Brims_2018.pdf	3694012 9bda26643f718009a360379e0fc9a82f139d4a48	no	94
Warnings:					
Information:					
7	Non Patent Literature	NPL_Petitioner_Reply_2019.pdf	1009196 656be56581802a14fc5e63800914f5b277e1c281	no	30
Warnings:					
Information:					
8	Non Patent Literature	NPL_Declaration_of_Dr-Anthony_Acampora_2019.pdf	949991 c77b00698011e6af86b237715dc2ae30c1f4062d	no	21
Warnings:					
Information:					
9	Non Patent Literature	NPL_Patent_Owner_Sur-Reply_2019.pdf	1015220 a5ccdf2d053ab07004db7932c3051c8e43c2c106	no	31
Warnings:					
Information:					
10		SIDS_091172-1100459.pdf	165948 a27485d691a10633d5db11a7639b9c87b3136ba0	yes	4
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	4	
Warnings:					
Information:					
11	Fee Worksheet (SB06)	fee-info.pdf	30746 700900ed95e882855deb088d97f0c8b759dba0a2	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	18571276

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/059,434	Filing Date 08/09/2018	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	04/18/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $230 =	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 $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VICTOR BARLOW/
*** 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

20350 7590 04/23/2019

KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

EXAMINER	
ZHAO, WEI	

ART UNIT	PAPER NUMBER
2473	

NOTIFICATION DATE	DELIVERY MODE
04/23/2019	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):

KTSDocketing2@kilpatrick.foundationip.com
ipefiling@kilpatricktownsend.com

PTOL-90A (Rev. 04/07)

Applicant-Initiated Interview Summary	**Application No.** 16/059,434	**Applicant(s)** Stapleton et al.	
	Examiner WEI ZHAO	**Art Unit** 2473	**AIA (FITF) Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) WEI ZHAO. (3) _____.

(2) KELVIN B. CATMULL. (4) _____.

Date of Interview: 17 April 2019.

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

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

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

Claim(s) discussed: 1-2.

Identification of prior art discussed: of the record.

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

Discussed the issues presented in the previous office action, such as the usage of the technical terms "common public interface standard" and "common public radio interface"; different views on the claim invention and the prior art. Applicant is going to work on the claim amendment. Examiner will reconsider if filed.

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

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

☐ Attachment

/WEI ZHAO/ Primary Examiner, Art Unit 2473	

Summary of Record of Interview Requirements

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

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

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

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

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

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

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

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

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

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

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

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

Examiner to Check for Accuracy

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

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

20350 7590 05/08/2019

KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

EXAMINER
ZHAO, WEI

ART UNIT	PAPER NUMBER
2473	

DATE MAILED: 05/08/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

TITLE OF INVENTION: DISTRIBUTED ANTENNA SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/08/2019

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

PART B - FEE(S) TRANSMITTAL

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

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

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence 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)

20350 7590 05/08/2019
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

TITLE OF INVENTION: DISTRIBUTED ANTENNA SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/08/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
ZHAO, WEI	2473	370-328000

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 03-09 or more recent) attached. **Use of a Customer Number is required.**

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

1 _____
2 _____
3 _____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

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

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

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

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

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

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

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

20350 7590 05/08/2019

KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

EXAMINER	
ZHAO, WEI	

ART UNIT	PAPER NUMBER
2473	

DATE MAILED: 05/08/2019

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

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

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

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

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	**Application No.** 16/059,434	**Applicant(s)** Stapleton et al.	
	Examiner WEI ZHAO	**Art Unit** 2473	**AIA (FITF) Status** No

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

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

1. ☑ This communication is responsive to 4/18/2019.
   ☐ 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 10-11 and 13-29 . 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 areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

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

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

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

Attachment(s)

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

/WEI ZHAO/
Primary Examiner, Art Unit 2473

DETAILED ACTION

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

Information Disclosure Statement

2. Acknowledgment is made of Applicant's submission of information disclosure statement (IDS), dated on March 12, 2019 and April 18, 2019. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Terminal Disclaimer

3. Acknowledgment is made of Applicant's submission of terminal disclaimer, dated April 17, 2019 and is accepted.

Response to Amendment

4. Acknowledgment is made of Applicant's submission of the claim amendment/remarks, dated April 18, 2019. Claim 12 has been amended. Claims 10, 11, and 13-29 are currently pending. This communication is considered fully responsive and sets forth below:

5. Objection to Specification: in the Response, filed April 18, 2019, Applicants canceled claim 12 that renders the objection to the specification moot. The previous objection to the specification is withdrawn.

6. Claim Double Patenting Rejection: Applicants submitted the terminal disclaimer in compliance with 37 C.F.R. 1.321. Therefore, the previous claim double patenting rejection is withdrawn.

7. Claim 112(b) Rejection: Applicants canceled the rejected claim that obviates the basis of the previous rejection. Therefore, the previous rejection under 35 U.S.C. 112(b) is withdrawn.

Allowable Subject Matter

8. Claims 10, 11, and 13-29 are allowed. The following is the reason for examiner's statement of allowance:

The closest prior art on record, Sulzberger et al. (US 2005/0152695) and Boldi et al. (US 8,855,489) are generally directed to various aspects of the radio base station with multiple radio frequency heads; and the communications method between a main station and processing nodes includes interconnecting the main station and the nodes in an optical path defining adjacent nodes and non-adjacent nodes.

However, in consideration of the claim amendments/remarks and the terminal disclaimer filed April 17, 2019, and further search, no prior art reference or a

combination of prior art references disclose or suggest the combination of limitations specified in the independent claims including:

"wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;" and "wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources," in claim 10.

Claim 18 includes similar limitations.

"transmitting from the baseband unit, at a second point in time, a digital representation of a second set of radio resources to the first remote unit, the second set of radio resources for transmission at the antenna of the first remote unit;" and "wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources," in claim 24.

Dependent claims 11, 13-17, 19-23, and 25-29 are also allowable for incorporating the features recited in the independent claims.

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

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WEI ZHAO whose telephone number is (571)270-5672. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang bin Yao can be reached on 5712723182. 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.

/WEI ZHAO/
Primary Examiner, Art Unit 2473

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/059,434	Stapleton et al.
	Examiner	Art Unit
	WEI ZHAO	2473

CPC - Searched*		
Symbol	Date	Examiner
H04W24/04, 40/02	02/14/2019, 5/2/2019	wz
H04L25/03; H04B1/0475, 7/022	02/14/2019, 5/2/2019	wz

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
searched in pgpub, uspat, ieee xplore, ip.com	02/14/2019, 5/2	wz
inventor search	02/14/2019, 5/3	wz
fmid search	02/14/2019, 5/3	wz
odp search in palm resource center	02/15/2019	wz

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
H04W	24/04	02/15/2019, 5/3	wz

/WEI ZHAO/ Primary Examiner, Art Unit 2473	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/059,434	Stapleton et al.
	Examiner	**Art Unit**
	WEI ZHAO	2473

CPC						
Symbol					**Type**	**Version**
H04W	/	40	/	02	F	2013-01-01
H03F	/	1	/	3247	I	2013-01-01
H03F	/	3	/	24	I	2013-01-01
H04L	/	25	/	03343	I	2013-01-01
H04L	/	27	/	362	I	2013-01-01
H04W	/	24	/	02	I	2013-01-01
H04B	/	1	/	0475	I	2013-01-01
H04W	/	24	/	04	I	2013-01-01
H04W	/	40	/	00	I	2013-01-01
H04L	/	27	/	2618	I	2013-01-01
H04W	/	72	/	0453	I	2013-01-01
H04B	/	7	/	022	I	2013-01-01
H04W	/	72	/	04	I	2013-01-01
H04W	/	88	/	085	I	2013-01-01
H03F	/	2200	/	336	A	2013-01-01
H03F	/	2200	/	57	A	2013-01-01
H03F	/	2201	/	3224	A	2013-01-01
H03F	/	2201	/	3233	A	2013-01-01
H04L	/	2025	/	03414	A	2013-01-01
H04B	/	2001	/	0425	A	2013-01-01

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/WEI ZHAO/ Primary Examiner, Art Unit 2473	03 May 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20190503

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/059,434	Stapleton et al.
	Examiner	**Art Unit**
	WEI ZHAO	2473

INTERNATIONAL CLASSIFICATION					
CLAIMED					
H04W	/	24	/	04	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/WEI ZHAO/ Primary Examiner, Art Unit 2473	03 May 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

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	Examiner	**Art Unit**
	WEI ZHAO	2473

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

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/WEI ZHAO/ Primary Examiner, Art Unit 2473	03 May 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20190503

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

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/059,434
	Filing Date	August 9, 2018
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	2473
	Examiner Name	Wei Zhao
	Attorney Docket Number	091172-1100459-102450US

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code [1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code [1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

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

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	Patent Owner's Preliminary Response filed in IPR2018-00571, dated May 16, 2018. 66 pages.	
	2.	Decision for Institution of *Inter Partes* Review for IPR2018-00571, dated August 14, 2018. 41 pages.	
	3.	Patent Owner's Response filed in IPR2018-00571, dated October 26, 2018. 69 pages.	
	4.	Declaration of Harry V. Bims, Ph.D. (Exhibit 2007) filed in IPR2018-00571, dated October 26, 2018. 94 pages.	
	5.	Petitioner's Reply filed in IPR2018-00571, dated January 11, 2019. 30 pages.	
	6.	Declaration of De. Anthony Acampora (Exhibit 1047) filed in IPR2018-00571, dated January 11, 2019. 21 pages.	
	7.	Patent Owner's Sur-Reply filed in IPR2018-00571, dated February 8, 2019. 31 pages.	

EXAMINER SIGNATURE

3

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.Z/

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	Attorney Docket Number	091172-1100459-102450US

Examiner Signature	/WEI ZHAO/		Date Considered	05/04/2019	

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

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

4
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Doc description: Information Disclosure Statement (IDS) Field

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U.S. PATENT APPLICATION PUBLICATIONS						
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NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1.	European Patent Application No. 11818695.6, Office Action mailed March 20, 2019, 6 pages.	
	2.	Patent Owner's Preliminary Response filed in IPR2018-00571, dated May 16, 2018, 66 pages.	
	3.	Decision for Institution of Inter Partes Review for IPR2018-00571, dated August 14, 2018, 41 pages.	
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	Art Unit	2473
	Examiner Name	Wei Zhao
	Attorney Docket Number	091172-1100459-102450US

EXAMINER SIGNATURE			
Examiner Signature /WEI ZHAO/		Date Considered 05/03/2019	

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

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

4

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	8	((("DALI") near3 ("WIRELESS") near3 ("INC"))).AS,AANM.	USPAT	OR	OFF	2019/05/03 18:34
L2	198	((("Stapleton") near3 ("Shawn") near3 ("Patrick"))).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/05/03 18:35
L3	198	((("Stapleton") near3 ("Shawn") near3 ("Patrick"))).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/05/03 18:35
L5	6	L1 and L2	USPAT	OR	OFF	2019/05/03 18:38
L6	6	L1 and L2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:39
L7	3394	distribut$3 with antenna$1 same resource$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:39
L8	784	distribut$3 with antenna$1 same radio$1 with resource$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:40
L9	138	distribut$3 with antenna$1 same radio$1 with resource$1 and H04W24/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:40
L10	111	distribut$3 with antenna$1 same radio$1 with resource$1 and H04W24/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:41
L11	13	distribut$3 with antenna$1 same radio$1 with resource$1 and H04W24/04$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2019/05/03 18:41

			DERWENT; IBM_TDB			
L12	86	distribut$3 with antenna$1 same radio$1 with resource$1 and H04W40/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:41
L13	69	distribut$3 with antenna$1 same radio$1 with resource$1 and H04W40/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:41
L14	66	distribut$3 with antenna$1 same radio$1 with resource$1 and H04W40/02$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:41
L16	37	distribut$3 with antenna$1 same radio$1 with resource$1 and radio with signal$4 and H04W40/02$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:42
L17	69	distribut$3 with antenna$1 same radio$1 with resource$1 and radio with signal$4 and H04L25/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:42
L18	69	distribut$3 with antenna$1 same radio$1 with resource$1 and radio with signal$4 and H04L25/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:43
L19	39	distribut$3 with antenna$1 same radio$1 with resource$1 and radio with signal$4 and H04L25/03$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:43
L20	28	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04L25/03$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:43
L21	40	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04B1/$.cpc.	US-PGPUB; USPAT; USOCR;	OR	OFF	2019/05/03 18:43

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
L23	14	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04B1/0$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:44
L24	110	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04B7/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:44
L25	47	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04B7/02$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:44
L26	11	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04B7/022$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/03 18:45
S161	187	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same higher-layer$1 or ((higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) with field$1 with aperiodic$2 with report$3 and decod$3 with configuration with information and decod$3 with (DCI or (downlink$1 with control$3 with information)) same calculat$3 with (csi or (channel$4 with state$1 with information)) with (DCI or (downlink$1 with control$3 with information)) with (configuration with information) and select$3 with configur$3 with state$1 same (DCI or (downlink$1 with control$3 with information)) with field$1	USPAT	OR	OFF	2019/05/01 09:16
S166	187	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same higher-layer$1 or ((higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) with field$1 with aperiodic$2 with report$3 and decod$3 with configuration with information and decod$3 with (DCI or (downlink$1 with control$3 with information)) same calculat$3 with (csi or (channel$4 with state$1 with information)) with (DCI or	USPAT	OR	OFF	2019/05/01 10:27

		(downlink$1 with control$3 with information)) with (configuration with information) same select$3 with configur$3 with state$1 same (DCI or (downlink$1 with control$3 with information)) with field$1 and H04W24/10$.cpc.				
S169	2	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) with aperiodic$2 with report$3 and decod$3 with configuration with information and decod$3 with (DCI or (downlink$1 with control$3 with information)) and H04W24/1$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 10:48
S171	3	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same aperiodic$2 with report$3 and decod$3 with configuration with information and H04W24/1$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 10:59
S172	9	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) and decod$3 with configuration with information and H04W24/1$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:03
S173	103	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) and decod$3 with configuration with information and H04W72/$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:04
S175	100	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) and decod$3 with configuration with information and H04W72/04$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:06
S176	91	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) and decod$3 with configuration with information and H04W72/042$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:07
S177	32	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2019/05/01 11:08

		with information)) same decod$3 with configuration with information and H04W72/042$.cpc.	DERWENT; IBM_TDB			
S180	47	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/00$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:24
S181	34	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/004$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:31
S182	30	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/0048$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:36
S183	36	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:37
S184	19	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/0053$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 11:38
S186	11	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/0057$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/01 13:57
S192	36	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/05/02 07:50

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	35	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/05/03 18:36
L27	2	distribut$3 with antenna$1 same radio$1 with resource$1 same radio with signal$4 and H04B7/022$.cpc.	USPAT	OR	OFF	2019/05/03 18:45
L28	11	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	USPAT	OR	OFF	2019/05/03 19:17
S185	2	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) with aperiodic$2 with report$3 and decod$3 with configuration with information and decod$3 with (DCI or (downlink$1 with control$3 with information)) and H04W24/10$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/05/01 10:29
S187	4	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/0057$.cpc.	USPAT	OR	OFF	2019/05/01 13:58
S188	11	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	USPAT	OR	OFF	2019/05/01 14:01
S189	9	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04W72/042$.cpc.	USPAT	OR	OFF	2019/05/01 14:02
S190	31	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04W72/042$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/05/01 15:59
S193	11	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher	USPAT	OR	OFF	2019/05/02 08:30

		with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.				
S194	35	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/05/02 08:31
S195	9	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04W72/042$.cpc.	USPAT	OR	OFF	2019/05/02 08:52
S199	6	MBMS same (TMGI or (temporary with mobile with (id$1 or identit$3 or identification or identifier$1))) and V2X with (message$1 or signal$1 or traffic) with (amount or volume$1) and allocat$3 with resource$1	US-PGPUB; USPAT	OR	OFF	2019/05/02 18:04
S200	7	MBMS and (TMGI or (temporary with mobile with (id$1 or identit$3 or identification or identifier$1))) and V2X with (message$1 or signal$1 or traffic) with (amount or volume$1) and allocat$3 with resource$1	US-PGPUB; USPAT	OR	OFF	2019/05/02 18:22
S201	11	MBMS and (TMGI or (temporary with mobile with (id$1 or identit$3 or identification or identifier$1))) and (V2X or vehicle$1) with (message$1 or signal$1 or traffic) with (amount or volume$1) and allocat$3 with resource$1	US-PGPUB; USPAT	OR	OFF	2019/05/02 18:23
S202	11	MBMS and (TMGI or (temporary with mobile with (id$1 or identit$3 or identification or identifier$1))) and (V2X or vehicle$1) with (message$1 or signal$1 or traffic or data) with (amount or volume$1) and allocat$3 with resource$1	US-PGPUB; USPAT	OR	OFF	2019/05/02 18:26
S203	27	MBMS and (TMGI or (temporary with mobile with (id$1 or identit$3 or identification or identifier$1))) and (V2X or vehicle$1 or MS$1 or (mobile with station$1)) with (message$1 or signal$1 or traffic or data) with (amount or volume$1) and allocat$3 with resource$1	US-PGPUB; USPAT	OR	OFF	2019/05/02 18:27
S204	11	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/005$.cpc.	USPAT	OR	OFF	2019/05/03 09:43
S205	5	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/0053$.cpc.	USPAT	OR	OFF	2019/05/03 09:51

S206	18	(csi or (channel$4 with state$1 with information)) with (RS or (reference$1 with signal$4)) same (higher-layer$1 or (higher with layer$1)) with configuration and (DCI or (downlink$1 with control$3 with information)) same decod$3 with configuration with information and H04L5/0053$.cpc.	US-PGPUB; USPAT	OR	OFF	2019/05/03 13:30

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For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:

☒ Customer Number: 00197

OR

☐ The attached Request for Customer Number (PTO/SB/125) form.

PATENT NUMBER (if known)	APPLICATION NUMBER
	16/059,434

Completed by (check one)

☐ Applicant/Inventor

☒ Attorney or Agent of record 57,535 (Reg. No.)

☐ Assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☐ Assignee recorded at Reel ___Frame ___

/Kelvin B. Catmull/
Signature

Kelvin B. Catmull
Typed or Printed Name

(650) 326-2400
Requester's telephone number

May 13, 2019
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *** Total of _____forms are submitted.**

This collection of information is required by 37 CFR 1.363. 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 5 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 COMPLETE D FORMS TO THIS ADDRESS.

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Electronic Patent Application Fee Transmittal

Application Number:	16059434
Filing Date:	09-Aug-2018
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Filer:	Kelvin B. Catmull/Vanessa Aguilar
Attorney Docket Number:	091172-1100459-102450US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**500**

Electronic Acknowledgement Receipt	
EFS ID:	35992243
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull
Filer Authorized By:	
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	13-MAY-2019
Filing Date:	09-AUG-2018
Time Stamp:	16:46:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$500
RAM confirmation Number	051419INTEFSW16472700
Deposit Account	201430
Authorized User	Kelvin Catmull
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

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1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal_DW-10245.PDF	136583 197a1d22787463b5d54530e80f4c48951c842e46	no	1
Warnings:					
Information:					
2	Maintenance Fee Address Change	SB47_DW-10245.pdf	156652 691ac4b513109114c70cc03fca872010d76bc88a	no	1
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3	Fee Worksheet (SB06)	fee-info.pdf	30599 7e885c2a7b6c926c71ecc385dbc51e94c6eed8ce	no	2
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PART B - FEE(S) TRANSMITTAL

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

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

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence 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)

20350 7590 05/08/2019
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

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

Vanessa M. Aguilar	(Typed or printed name)
/Vanessa M. Aguilar/	(Signature)
2019-05-13	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US	2049

TITLE OF INVENTION: DISTRIBUTED ANTENNA SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/08/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
ZHAO, WEI	2473	370-328000

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 03-09 or more recent) attached. **Use of a Customer Number is required.**

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

1 Kilpatrick Townsend & Stockton LLP
2
3

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Dali Wireless, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Menlo Park, 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. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies .....

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

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

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 201430

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 /Kelvin B. Catmull/ Date May 13, 2019

Typed or printed name Kelvin B. Catmull Registration No. 57,535

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on May 22, 2019.

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Vanessa M. Aguilar/

PATENT
Attorney Docket No.: 091172-1100459-102450US
Client Ref. No.: DW-1024-5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2049
Shawn Patrick Stapleton	Examiner: Wei Zhao
Application No.: 16/059,434	Technology Center/Art Unit: 2473
Filed: Aug 9, 2018	
For: DISTRIBUTED ANTENNA SYSTEM	STATEMENT OF SUBSTANCE OF INTERVIEW
Customer No.: 20350	

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

Commissioner:

The undersigned thanks Examiner Zhao for the helpful telephone discussions held on April 17, 2019. The pending claims and outstanding office action were discussed. No specific agreement was reached.

Respectfully submitted,

/Kelvin B. Catmull/
Kelvin B. Catmull
Registration No. 57,535

KILPATRICK TOWNSEND & STOCKTON LLP

KBC:vmg

Electronic Acknowledgement Receipt	
EFS ID:	36091124
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Kelvin B. Catmull/Vanessa Aguilar
Filer Authorized By:	Kelvin B. Catmull
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	22-MAY-2019
Filing Date:	09-AUG-2018
Time Stamp:	19:21:19
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	Applicant summary of interview with examiner	Statement_Of_Substance_Interview_091172-1100459.pdf	72414 60db00050d44d9c56ae321376305395ebd97fe81	no	1

Warnings:

Information:	
Total Files Size (in bytes):	72414

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.

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

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	Herewith
	First Named Inventor	Shawn Patrick Stapleton
	Art Unit	
	Examiner Name	
	Attorney Docket Number	091172-1100459-102450US

	178	101521893	CN	A	09-02-2009	Comba Telecom System Holdings		
	179	2009-296335	JP	A2	12-17-2009	Nippon Telegraph & Telephone		
	180	101453799 (dupe)	CN	A	06-10-2009	Comba Telecom Sys China Co Ltd		
	181	10-2009-0088083	KR	A	08-19-2009	Samsung Electronics Co Ltd		
	182	00/23956	WO	A1	04-27-2000	Univ Maryland		
	183	101453699	CN	A	06-10-2009	Huawei Tech Co Ltd.		
	184	2008-506322	JP	A	02-28-2008	Utstarcom Telecom Co., Ltd.		
	185	2010/087031	WO	A1	08-05-2010	Hitachi Ltd		
	186	0368673	EP	A1	05-16-1990	British Telecommunications		
	187	01/56197	WO	A2	08-02-2001	Scientific-Atlanta, Inc.		
	188	98/24256	WO	A2	06-04-1998	Ericsson Inc.		
	189	0642243	EP	A1	03-08-1995	Roke Manor Research Limited		
	190	2002-158615	JP	A	05-31-2002	NAT INST LAND & INFRASTRUCTURE		
	191	2008-135955	JP	A	06-12-2008	Toshiba Corp		
	192	1713290	EP	A1	10-18-2006	Huwaei Technology Co. Ltd.		
	193	1992-207532	JP	A	07-29-1992	Nippon Telegr & Teleph Corp		
	194	1993-136724	JP	A	01-06-1993	A T R Koudenpa Tsushin Kenkyush		
	195	1924109	EP	A1	05-21-2008	Alcatel Lucent		
	196	101394647	CN	A	03-25-2009	Datang Mobile Comm Equip Co		
	197	10-1996-0702978	KR	A	05-23-1996	ADC Telecommunications, Inc.		
	198	2010133942	WO	A1	11-2010 ~~11-25-20110~~	Teko Telcom S P A		
	199	1774094	CN	A	05-17-2006	Huawei Tech Co Ltd.		
	200	201307942	CN	Y	09-09-2009	Comba Telecom Systems China LTD		
	201	101621806	CN	A	01-06-2010	Comba Telecom Systems(China) Ltd.		

Change(s) applied to document,
/J.G./
5/15/2019

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.Z/

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/059,434	06/25/2019	10334499	091172-1100459-102450US	2049

20350 7590 06/05/2019

KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

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):

Shawn Patrick Stapleton, Vancouver, CANADA;
Dali Wireless, Inc., Menlo Park, CA;
Paul Lemson, Woodinville, WA;
Bin Lin, Burnaby, CANADA;
Albert S. Lee, San Mateo, 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.

IR103 (Rev. 10/09)

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

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
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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/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/059,434
Filing Date	08-09-2018
First Named Inventor	Shawn Patrick Stapleton
Title	DISTRIBUTED ANTENNA SYSTEM
Art Unit	2473
Examiner Name	ZHAO, WEI
Attorney Docket Number	091172-1100459-102450US

SIGNATURE of Applicant or Patent Practitioner

Signature	/Jennifer Spaith/	Date (Optional)	
Name	Jennifer Spaith	Registration Number	51,916
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)	DALI WIRELESS, INC.		

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

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in 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: 27076

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):

DALI WIRELESS, INC.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

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

Signature		Date (Optional)	
Name	Albert Lee		
Title	CEO		

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

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt	
EFS ID:	36492651
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	20350
Filer:	Jennifer Lane Spaith/Angela Staschke
Filer Authorized By:	Jennifer Lane Spaith
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	03-JUL-2019
Filing Date:	09-AUG-2018
Time Stamp:	13:20:40
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	Power of Attorney	POA_16059434_2049_P282730US07.pdf	642304 c7e9cadb22cc2e5953837492943b92df93c056f1	no	2

Warnings:

The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing	
Information:	
Total Files Size (in bytes):	642304

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

27076
DORSEY & WHITNEY LLP - Seattle
INTELLECTUAL PROPERTY DEPARTMENT
Columbia Center
701 Fifth Avenue, Suite 6100
Seattle, WA 98104-7043

POA ACCEPTANCE LETTER

OC000000109461122

Date Mailed: 07/09/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/03/2019.

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

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

/ggasgedom/

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
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

20350
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

POWER OF ATTORNEY NOTICE

OC000000109461092

Date Mailed: 07/09/2019

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/03/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

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

/ggasgedom/

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT5633990

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	SECURITY INTEREST

CONVEYING PARTY DATA

Name	Execution Date
DALI WIRELESS, INC.	06/18/2019

RECEIVING PARTY DATA

Name:	DALI RESEARCH (NORTHWIND) LLC
Street Address:	156 WEST 56TH STREET
Internal Address:	9TH FLOOR
City:	NEW YORK
State/Country:	NEW YORK
Postal Code:	10019

PROPERTY NUMBERS Total: 143

Property Type	Number
Application Number:	15251293
Application Number:	13960346
Application Number:	15682431
Application Number:	16059434
Application Number:	10137556
Application Number:	11262079
Application Number:	11799239
Application Number:	11961969
Application Number:	12021241
Application Number:	13211243
Application Number:	13211247
Application Number:	13301224
Application Number:	13404679
Application Number:	13619538
Application Number:	13724157
Application Number:	13887133
Application Number:	13913207
Application Number:	14095891
Application Number:	14169719

Property Type	Number
Application Number:	14245190
Application Number:	14260145
Application Number:	14480285
Application Number:	14684678
Application Number:	14691152
Application Number:	14788567
Application Number:	14800515
Application Number:	14949405
Application Number:	14991264
Application Number:	15205820
Application Number:	15223819
Application Number:	14743789
Application Number:	14044668
Application Number:	13770113
Application Number:	14574071
Application Number:	14837850
Application Number:	15782309
Application Number:	15812018
Application Number:	15391408
Application Number:	16230750
Application Number:	16388680
Application Number:	11962025
Application Number:	16118329
Application Number:	12203064
Application Number:	12203076
Application Number:	15875936
Application Number:	12108502
Application Number:	14271881
Application Number:	15684580
Application Number:	12108507
Application Number:	12330451
Application Number:	13481389
Application Number:	13776163
Application Number:	12767669
Application Number:	12603419
Application Number:	13553967
Application Number:	14087682
Application Number:	14885890

Property Type	Number
Application Number:	12928934
Application Number:	13705022
Application Number:	13894987
Application Number:	14553828
Application Number:	15181033
Application Number:	12928933
Application Number:	14248597
Application Number:	14754908
Application Number:	15718469
Application Number:	16213103
Application Number:	12928931
Application Number:	14337004
Application Number:	15827794
Application Number:	12928943
Application Number:	14020425
Application Number:	14335647
Application Number:	14703579
Application Number:	13211236
Application Number:	14479875
Application Number:	15786396
Application Number:	16406252
Application Number:	16175520
Application Number:	16410860
Application Number:	13602818
Application Number:	14333277
Application Number:	14831626
Application Number:	13625760
Application Number:	14480267
Application Number:	14918371
Application Number:	16279535
Application Number:	13686036
Application Number:	14225673
Application Number:	14960177
Application Number:	13670162
Application Number:	13670290
Application Number:	15857356
Application Number:	13671203
Application Number:	13754702

Property Type	Number
Application Number:	14678779
Application Number:	15445467
Application Number:	16039182
Application Number:	13753288
Application Number:	13777185
Application Number:	15383121
Application Number:	16054678
Application Number:	13894309
Application Number:	14887922
Application Number:	15383431
Application Number:	15912859
Application Number:	13935157
Application Number:	15154073
Application Number:	15676631
Application Number:	13945736
Application Number:	14956040
Application Number:	16352065
Application Number:	13950160
Application Number:	16038613
Application Number:	14095706
Application Number:	16230253
Application Number:	13777194
Application Number:	14552231
Application Number:	14987093
Application Number:	15492902
Application Number:	16240433
Application Number:	14168328
Application Number:	15582776
Application Number:	16205567
Application Number:	14171600
Application Number:	15279136
Application Number:	14183297
Application Number:	14189044
Application Number:	15907153
Application Number:	14199617
Application Number:	15917342
Application Number:	14257209
Application Number:	15819279

Property Type	Number
Application Number:	14590447
Application Number:	14580585
Application Number:	14621192
Application Number:	16360980
Application Number:	14639418
Application Number:	15090402
Application Number:	15820299
Application Number:	15203015
Application Number:	15358060
Application Number:	15594323

CORRESPONDENCE DATA

Fax Number: (212)586-5095

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 2125865800
Email: DFRIEDMAN@CTSWLAW.COM
Correspondent Name: DANIEL J. FRIEDMAN
Address Line 1: 420 LEXINGTON AVENUE
Address Line 2: SUITE 2400
Address Line 4: NEW YORK, NEW YORK 10170

NAME OF SUBMITTER:	DANIEL J. FRIEDMAN
SIGNATURE:	/Daniel J. Friedman/
DATE SIGNED:	07/24/2019
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 42
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PATENT SECURITY AGREEMENT

This Patent Security Agreement, dated as of June 18, 2019 (this "Agreement"), made by Dali Wireless, Inc., a Delaware corporation ("Grantor"), in favor of Dali Research (Northwind) LLC, a Delaware limited liability company (together with its successors and assigns, "Grantee"). Reference is made to that certain Prepaid Forward Purchase Agreement between Buyer and Seller, dated as of the date hereof (as it may be amended from time to time, the "Purchase Agreement").

RECITALS

WHEREAS, the Grantor has an ownership interest in certain Patents set forth on Exhibit A hereto (the "Patents"); and

WHEREAS, the Grantor and Grantee are parties to that certain Security Agreement, of even date herewith (as from time to time amended or supplemented, the "Security Document"); and

WHEREAS, pursuant to the Security Document, Grantor has granted to Grantee a security interest in certain of its assets, including, without limitation, the Patents, to secure the performance of Grantor's obligations under the Security Document and related agreements; and

WHEREAS, it is a condition precedent to Grantee's entry into the Security Document and related agreements that the Grantor execute and deliver this Agreement to Grantee; and

WHEREAS, the Grantor and Grantee by this instrument seek to confirm and make a record of the grant of the security interest in the Patents and the assignment of the Patents upon the occurrence of an Event of Default (as defined below) in accordance with the terms of this Agreement; and

WHEREAS, capitalized terms used and not defined herein have the meanings given to them in the Security Document.

NOW, THEREFORE, for good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Grantor hereby agrees, confirms and acknowledges as follows:

1. As collateral security for the payment and performance of the Obligations, Grantor hereby grants and conveys to Grantee a first priority continuing security interest in and lien upon all Patents now owned and hereafter acquired by Grantor and the Proceeds and products thereof. The Grantor does hereby acknowledge and confirm that the Patents, the goodwill associated therewith, and the Proceeds and products thereof constitute Collateral pledged by Grantor to Grantee pursuant to the Security Document.

2. The Grantor further acknowledges and confirms that the rights and remedies of Grantee with respect to the Patents are more fully set forth in the Security Document, the terms and provisions of which are incorporated herein by reference.

3. The Grantor hereby irrevocably constitutes and appoints Grantee, with full power of substitution, as its true and lawful attorney-in-fact, with full irrevocable power and authority in its place and stead and in its name or otherwise, from time to time in Grantee's sole discretion, at Grantee's sole cost and expense, to take any and all action and to execute and deliver any and all documents and instruments which Grantee may deem reasonably necessary or advisable to (a) accomplish the purposes of perfecting, continuing and preserving, a continuing first priority security interest in the Patents and the goodwill associated therewith in favor of Grantee, and (b) effect a transfer of the Patents and the goodwill associated therewith to Grantee or to Grantee's designees without further consent or authorization of the Grantor upon the occurrence of an Event of Default (as defined in the Security Document) (an "Event of Default"). In furtherance and not in limitation of the foregoing, if an Event of Default has occurred and is continuing, the Grantee is hereby authorized file with the United States Patent and Trademark Office or with such other governmental authorities, the assignment in the form substantially similar to that of Exhibit 1 attached to this Agreement, together with such other instruments and documents as Grantee may deem necessary or appropriate to effectuate the foregoing.

4. Grantee is hereby authorized to file or record this Agreement or any other instrument or documents in such public offices and with such governmental authorities, including the United States Patent and Trademark Office, as Grantee may determine from time to time for the purpose of evidencing the foregoing grant of security.

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IN WITNESS WHEREOF, this Patent Security Agreement has been executed and delivered as of the day and year first above written.

GRANTOR

DALI WIRELESS, INC.

By:_____

Name:Albert Lee

Title:CEO

ACCEPTED AND AGREED:

GRANTEE:

DALI RESEARCH (NORTHWIND) LLC

By_____

Title: Authorized Person

EXHIBIT 1

ASSIGNMENT OF PATENTS

This **ASSIGNMENT OF PATENTS** (this "Assignment"), dated as of _____ __, 20__, made by **Dali Wireless, Inc.**, a Delaware corporation ("Assignor"), in favor of **Dali Research (Northwind) LLC**, a Delaware limited liability company (together with its successors and assigns, "Grantee" or "Assignee") and the Assignee as set forth below. For good and valuable consideration, the receipt and adequacy of are hereby acknowledged, Assignor hereby assigns to Grantee the Patents set forth on Exhibit A hereto (the "Patents") as follows:

1. Assignment of Patents. Assignor hereby assigns, transfers, and conveys to _____, a _____ with offices at _____ (the "Assignee") all of Assignor's right, title and interest in and to the Patents together with the goodwill associated therewith and the right to sue for past infringement of the Patents.

3. Filing and Recordation. Assignee is hereby authorized to file or record this Assignment or any other instrument in such public offices and with such governmental authorities, including the United States Patent and Trademark Office, as Assignee may determine from time to time for the purpose of evidencing the foregoing assignment.

IN WITNESS WHEREOF, Assignor has executed this Assignment of Patents as of the date first above written.

ASSIGNOR:

DALI WIRELESS, INC.

By:_____

Name:_____

Title:_____

TITLE	COUNTRY	APPLN. NO.	FILING DATE	PUB NO.	PUB DATE	PATENT NO.	ISSUE DATE	STATUS
SYSTEM AND METHOD FOR DIGITAL MEMORIZED PREDISTORTION FOR WIRELESS COMMUNICATION	United States of America	10/137,556	5/1/02	US 2003-0207680 A1	11/6/03	6,985,704	1/10/06	Issued
SYSTEM AND METHOD FOR DIGITAL MEMORIZED PREDISTORTION FOR WIRELESS COMMUNICATION	United States of America	11/262,079	10/27/05	US 2006-0046665 A1	3/2/06	8,326,238	12/4/12	Issued
SYSTEM AND METHOD FOR DIGITAL MEMORIZED PREDISTORTION FOR WIRELESS COMMUNICATION	United States of America	13/619,538	9/14/12	US-2013-0243124-A1		8,731,495	5/20/14	Issued
SYSTEM AND METHOD FOR DIGITAL MEMORIZED PREDISTORTION FOR WIRELESS COMMUNICATION	United States of America	14/245,190	4/4/14	US-2014-0306762-A1		9,031,521	5/12/15	Issued
SYSTEM AND METHOD FOR DIGITAL MEMORIZED PREDISTORTION FOR WIRELESS COMMUNICATION	United States of America	14/684,678	4/13/15	US-2015-0326349-A1		9,374,196	6/21/16	Issued
SYSTEM AND METHOD FOR DIGITAL MEMORIZED PREDISTORTION FOR WIRELESS COMMUNICATION	United States of America	16/230,750	12/21/18					Pending
HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	China	200780023875.1	4/30/07	101479956	7/31/13	ZL200780023875.1	7/31/13	Issued
HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	United States of America	11/799,239	4/30/07	US 2007/0241812 A1		8,064,850	11/22/11	Issued
HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	United States of America	13/301,224	11/21/11	US-2012-0135695-A1	5/31/12	8,620,234	12/31/13	Issued
HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	United States of America	14/095,891	12/3/13	US-2014-0179248-A1		9,054,758	6/9/15	Issued
HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	United States of America	14/691,152	4/20/15	US-2015-0333710-A1		9,742,446	8/22/17	Issued

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HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	United States of America	15/682,431	8/21/17	US-2018-0097530-A1		10,305,521	5/28/19	Issued
HIGH EFFICIENCY LINEARIZATION POWER AMPLIFIER FOR WIRELESS COMMUNICATION	United States of America	16/388,680	4/18/19					Pending
POWER AMPLIFIER PREDISTORTION METHODS AND APPARATUS	United States of America	11/962,025	12/20/07			8,472,897	6/25/13	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	China	200880003130.3	1/28/08	101606315	12/16/09	ZL200880003130.3	7/2/14	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	Macao	J/001490	1/28/08		1/2/15	J/001490	11/13/14	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	United States of America	12/021,241	1/28/08	US 2008-0174365 A1	7/24/08	8,380,143	2/19/13	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	China	201410199319.1	1/28/08	CN 103997301 A	9/28/18	ZL 201410199319.1	9/28/18	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	Hong Kong	14109438.5	9/18/14	1196186A	12/5/14			Published
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	Macao	J/001456	7/2/14					Pending
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	United States of America	13/724,157	12/21/12	US-2013-0147550-A1		9,077,297	7/7/15	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	United States of America	14/788,567	6/30/15	US-2016-0036394-A1		10,097,142	10/9/18	Issued
POWER AMPLIFIER TIME-DELAY INVARIANT PREDISTORTION METHODS AND APPARATUS	United States of America	16/118,329	8/30/18					Pending
ANALOG POWER AMPLIFIER PREDISTORTION METHODS AND APPARATUS	United States of America	12/203,064	9/2/08	US-2009-0085658-A1		8,693,962	4/8/14	Issued

POWER AMPLIFIER PREDISTORTION METHODS AND APPARATUS USING ENVELOPE AND PHASE DETECTOR	United States of America	12/203,076	9/2/08	US-2009-0096521-A1	4/16/09	8,224,266	7/17/12	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	China	200780051434.2	12/20/07	102017553	10/15/14	ZL200780051434.2	10/15/14	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDE-BAND COMMUNICATION SYSTEMS	India	4344/CHENP/2009	12/20/07			283900	6/5/17	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	Japan	2009-543544	12/20/07	2010-518660	7/17/13	5236661	4/5/13	Issued
METHOD AND SYSTEM FOR BASED AND PREDISTORITION LEANARIZATION IN MULTI-CHANNEL WIDE-BAND COMMUNICATION SYSTEMS	Macao	J/001620	12/20/07			J/001620	3/10/15	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	11/961,969	12/20/07	US 2008/0152037 A1		8,149,950	4/3/12	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	China	201410462933.2	12/20/07	CN 104202279 A				Published
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	European Patent Office	18187871.1	12/20/07	3416340				Published

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METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	Hong Kong	15105454.1	12/20/07	1205382A	12/11/15			Published
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	13/404,679	2/24/12	US-2012-0147993-A1	6/14/12	8,509,347	8/13/13	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	13/887,133	5/3/13	US-2013-0315291-A1		8,855,234	10/7/14	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	14/480,285	9/8/14	US-2015-0092830-A1		9,246,731	1/26/16	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	14/991,264	1/8/16	US-2016-0269210-A1		9,913,194	3/6/18	Issued
METHOD AND SYSTEM FOR BASEBAND PREDISTORTION LINEARIZATION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	15/875,936	1/19/18	US-2018-0279197-A1				Published
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	China	200880021049.8	4/23/08	101720528	6/2/10	ZL200880021049.8	3/19/14	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	Germany	08746721.3	4/23/08	2143209		60 2008 056 496.7	8/15/18	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	European Patent Office	08746721.3	4/23/08	2143209	8/15/18	2143209	8/15/18	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	France	08746721.3	4/23/08	2143209		2143209	8/15/18	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	United Kingdom	08746721.3	4/23/08	2143209		2143209	8/15/18	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	India	7544/DELNP/2009	4/23/08	28/2010				Published

DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	Japan	2010-506483	4/23/08	2010-525758	7/22/10	5591106	8/8/14	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	Republic of Korea	10-2009-7024361	4/23/08	10-2010-0017270	3/24/15	10-1503548	3/11/15	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	Macao	J/001446	4/23/08		9/29/14	J/001446	8/25/14	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	Netherlands	08746721.3	4/23/08	2143209		2143209	8/15/18	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	United States of America	12/108,502	4/23/08	US-2008-0265996-A1		8,811,917	8/19/14	Issued
METHOD FOR UPDATING COEFFICENTS OF A PREDISTORTION CIRCUIT AND ADAPTATION CIRCUIT	Republic of Korea	10-2014-7021366	4/23/08		12/22/16	10-1688710	12/15/16	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	United States of America	14/271,881	5/7/14	US-2014-0327481-A1		9,768,739	9/19/17	Issued
DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM	United States of America	15/684,580	8/23/17	US-2018-0102747-A1				Published
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	China	200880021149.0	4/23/08	102089966	2/3/16	ZL 2008800211490	2/3/16	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	Germany	08829011.9	4/23/08	2145385		60 2008 057 483.0	10/17/18	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	European Patent Office	08829011.9	4/23/08	2145385	10/17/18	2145385	10/17/18	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	France	08829011.9	4/23/08	2145385		2145385	10/17/18	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	United Kingdom	08829011.9	4/23/08	2145385		2145385	10/17/18	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	India	7514/DELNP/2009	4/23/08	27/2010	9/10/18	300878	9/10/18	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	Japan	2010-504909	4/23/08	2010-530148	4/16/14	5474764	2/14/14	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	Republic of Korea	10-2009-7024268	4/23/08	10-2010-0017214	1/20/15	10-1484796	1/14/15	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	Macao	J/002140	4/23/08		9/13/16	J/002140	8/9/16	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	Netherlands	08829011.9	4/23/08	2145385		2145385	10/17/18	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER	United States of America	12/108,507	4/23/08	US 2008-0284509 A1	11/20/08	7,688,135	3/30/10	Issued
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	China	200880126324.2	12/8/08	102150361	11/9/16	ZL 2008801263242	11/9/16	Issued

BASEBAND-DERIVED RF DIGITAL PREDISTORTION	European Patent Office	08873193.0	12/8/08	2248255				Published
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	India	4196/CHENP/2010	12/8/08	01/2011				Published
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	Japan	2010-536550	12/8/08	2011-511493	7/31/13	5250636	4/19/13	Issued
BASEBAND-DERIVED WIDEBAND RF DIGITAL PREDISTORTION SYSTEM	Republic of Korea	10-2010-7015019	12/8/08	10-2010-0108546	10/25/16	10-1669173	10/19/16	Issued
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	Macao	J/002468	12/8/08		5/4/17	J/002468	4/11/17	Issued
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	United States of America	12/330,451	12/8/08	US 2009-0146736 A1		8,213,884	7/3/12	Issued
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	United States of America	13/481,389	5/25/12	US-2012-0230382-A1	9/13/12	8,401,499	3/19/13	Issued
BASEBAND-DERIVED RF DIGITAL PREDISTORTION	United States of America	13/776,163	2/25/13	US-2013-0214861-A1		8,548,403	10/1/13	Issued
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	China	201080025887.X	4/26/10	CN 102460385 A	5/16/12	ZL201080025887X	3/2/16	Issued
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	European Patent Office	10767899.7	4/26/10	2 430 531	3/21/12			Allowed
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	Indonesia	W-00 2012 01448	4/26/10		12/19/17	ID P 000 048 875	12/19/17	Issued
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	India	8527/CHENP/2011	4/26/10	8527/CHENP/2011				Published
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	Republic of Korea	10-2011-7027891	4/26/10			10-1967471	4/3/19	Issued
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	Macao	J/002198	4/26/10		10/17/16	J/002198	9/12/16	Issued
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	United States of America	12/767,669	4/26/10	US 2010-0271957 A1	10/28/10	9,026,067	5/5/15	Issued
REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	Japan	2015-178686	4/26/10					Pending

REMOTELY RECONFIGURABLE POWER AMPLIFIER SYSTEM AND METHOD	Japan	2017-253609	4/26/10					Pending
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER WITH POWER TRACKING	United States of America	12/603,419	10/21/09	US-2010-0176885-A1	7/15/10	8,274,332	9/25/12	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER WITH POWER TRACKING	United States of America	13/553,967	7/20/12	US-2013-0009707-A1	1/10/13	8,618,883	12/31/13	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER WITH POWER TRACKING	United States of America	14/087,682	11/22/13	US-2014-0191805-A1		9,184,703	11/10/15	Issued
N-WAY DOHERTY DISTRIBUTED POWER AMPLIFIER WITH POWER TRACKING	United States of America	14/885,890	10/16/15	US-2016-0173040-A1		10,298,177	5/21/19	Issued
MULTI-BAND WIDEBAND POWER AMPLIFIER DIGITAL PREDISTORTION SYSTEM AND METHOD	China	201080064338.3	12/21/10	CN 102939716A		ZL 201080064338.3	2/3/16	Issued
MULTI-BAND WIDEBAND POWER AMPLIFIER DIGITAL PREDISTORTION SYSTEM AND METHOD	Macao	J/2106	12/21/10			J/002106	7/29/16	Issued
MULTI-BAND WIDEBAND POWER AMPLIFIER DIGITAL PREDISTORITION SYSTEM AND METHOD	United States of America	12/928,934	12/21/10	US-2012-0154038-A1	6/21/12	8,351,877	1/8/13	Issued
DIGITAL PREDISTORTION SYSTEM AND METHOD FOR AMPLIFYING SIGNALS	China	201610003690.5	12/21/10	CN 105634415A	3/8/19	ZL 201610003690.5	3/8/19	Issued
A MULTI-BAND DIGITAL PREDISTORTION SYSTEM AND A METHOD FOR AMPLIFYING SIGNALS	Hong Kong	16112532.2	12/21/10	1224439A	8/18/17			Published
DIGITAL PREDISTORTION SYSTEM AND METHOD FOR AMPLIFYING SIGNALS	Macao	J/3685	12/21/10					Pending
MULTI-BAND WIDE BAND POWER AMPLIFIER DIGITAL PREDISTORTION SYSTEM	United States of America	13/705,022	12/4/12	US-2013-0094612-A1		8,467,747	6/18/13	Issued

MULTI-BAND WIDE BAND POWER AMPLIFIER DIGITAL PREDISTORTION SYSTEM	United States of America	13/894,987	5/15/13	US-2013-0251066-A1		8,903,337	12/2/14	Issued
MULTI-BAND WIDE BAND POWER AMPLIFIER DIGITAL PREDISTORTION SYSTEM	United States of America	14/553,828	11/25/14	US-2015-0171899-A1		9,379,745	6/28/16	Issued
MULTI-BAND WIDE BAND POWER AMPLIFIER DIGITAL PREDISTORTION SYSTEM	United States of America	15/181,033	6/13/16	US-2017-0047952-A1				Published
REMOTE RADIO HEAD UNIT WITH WIDEBAND POWER AMPLIFIER AND METHOD	China	201080064329.4	12/21/10	CN 102948081A	6/1/16	ZL 201080064329.4	6/1/16	Issued
REMOTE RADIO HEAD UNIT WITH WIDEBAND POWER AMPLIFIER AND METHOD	Macao	J/2296	12/21/10			J/002296	12/14/16	Issued
REMOTE RADIO HEAD UNIT SYSTEM WITH WIDEBAND POWER AMPLIFIER AND METHOD	United States of America	12/928,933	12/21/10	US 2011-0158081 A1		8,730,786	5/20/14	Issued
SYSTEM FOR IMPROVING ISOLATION BETWEEN TRANSMITTERS AND RECEIVERS	Hong Kong	17103802.3	12/21/10	1230352A	12/1/17			Published
REMOTE RADIO HEAD UNIT SYSTEM WITH WIDEBAND POWER AMPLIFIER AND METHOD	United States of America	14/248,597	4/9/14	US-2014-0219174-A1		9,106,453	8/11/15	Issued
REMOTE RADIO HEAD UNIT SYSTEM WITH WIDEBAND POWER AMPLIFIER	United States of America	14/754,908	6/30/15	US-2015-0382363-A1		9,814,053	11/7/17	Issued
REMOTE RADIO HEAD UNIT SYSTEM WITH WIDEBAND POWER AMPLIFIER	United States of America	15/718,469	9/28/17	US-2018-0152947-A1		10,153,789	12/11/18	Issued
REMOTE RADIO HEAD UNIT SYSTEM WITH WIDEBAND POWER AMPLIFIER	United States of America	16/213,103	12/7/18					Pending
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	China	201080064414.0	12/21/10	CN 102948071A		ZL 201080064414.0	6/22/16	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Germany	10838778.8	12/21/10	2517353	10/31/12	60 2010 032 691.8	4/20/16	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	European Patent Office	10838778.8	12/21/10	2517353	10/31/12	2517353	4/20/16	Issued

MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	United Kingdom	10838778.8	12/21/10	2517353	10/31/12	2517353	4/20/16	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Indonesia	W00201202630	12/21/10	2014/04399	5/17/18	IDP000051138	5/17/18	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	India	6164/CHENP/2012	12/21/10	2012CN06164				Published
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Japan	2012-545469	12/21/10	2013-515423		5761646	6/19/15	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Republic of Korea	10-2012-7019385	12/21/10			10-1815329	12/28/17	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Macao	J/2312	12/21/10			J/002312	1/4/17	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	United States of America	12/928,931	12/21/10	US-2011-0156815-A1		8,804,870	8/12/14	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	European Patent Office	16166094.9	12/21/10	3068047				Published
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Hong Kong	17101974.9	12/21/10	1228604A	11/3/17			Published
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	Indonesia	P00201803072	12/21/10					Pending
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	United States of America	14/337,004	7/21/14	US-2015-0010110-A1		9,866,414	1/9/18	Issued
MODULATION AGNOSTIC DIGITAL HYBRID MODE POWER AMPLIFIER SYSTEM AND METHOD	United States of America	15/827,794	11/30/17	US-2018-0227152-A1				Published
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	China	201080064443.7	12/21/10	CN 102870494A	4/20/16	ZL 201080064443.7	4/20/16	Issued

HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Germany	10848623.4	12/21/10	2524568	11/21/12	60 2010 036 118.7	8/31/16	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	European Patent Office	10848623.4	12/21/10	2524568	8/31/16	2524568	8/31/16	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	France	10848623.4	12/21/10	2524568	11/21/12	2524568	8/31/16	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	United Kingdom	10848623.4	12/21/10	2524568	11/21/12	2524568	8/31/16	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Indonesia	W00201202631	12/21/10	2013/00167 A	3/21/16	IDP000040 655	3/21/16	Issued
HIGH EFFICIENCY REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	India	6163/CHENP/2012	12/21/10	2012CN06163				Published
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Japan	2012-545471	12/21/10	2013-515424		5744910	5/15/15	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM FOR WIRELESS COMMUNICATIONS	Republic of Korea	10-2012-7019387	12/21/10			10-1763970	7/26/17	Issued

HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Macao	J/2206	12/21/10			J/002206	10/18/16	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	United States of America	12/928,943	12/21/10	US-2012-0155572-A1	6/21/12	8,542,768	9/24/13	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Germany	16181745.7	12/21/10	3110231		60 2010 050 454.9	5/2/18	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	European Patent Office	16181745.7	12/21/10	3110231	5/2/18	3110231	5/2/18	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	France	16181745.7	12/21/10	3110231		3110231	5/2/18	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	United Kingdom	16181745.7	12/21/10	3110231		3110231	5/2/18	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Hong Kong	17105876.9	12/21/10	1232372A	1/18/19	1232372B	1/18/19	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	Netherlands	16181745.7	12/21/10	3110231		3110231	5/2/18	Issued

HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	United States of America	14/020,425	9/6/13	US-2014-0079153-A1		8,824,595	9/2/14	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	United States of America	14/335,647	7/18/14	US-2015-0080054-A1		9,048,797	6/2/15	Issued
HIGH EFFICIENCY, REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT SYSTEM AND METHOD FOR WIRELESS COMMUNICATIONS	United States of America	14/703,579	5/4/15	US-2015-0381217-A1		9,948,332	4/17/18	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	China	201180050053.9	8/16/11	CN 103180844 A	10/3/17	ZL 201180050053.9	10/3/17	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	11818694.9	8/16/11	2606435				Published
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	Indonesia	W00 201300982	8/16/11	2014/01150		IDP000048511	11/9/17	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	India	1764/CHENP/2013	8/16/11					Published
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	Japan	2013-524941	8/16/11	2013-541255		5911149	4/8/16	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2013-7006774	8/16/11			10-1662879	9/28/16	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	Macao	J/2833	8/16/11			J/002833	2/15/18	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/211,236	8/16/11	US-2012-0069880-A1		8,848,766	9/30/14	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	China	201710791641.7	8/16/11	CN 107682021A				Published

REMOTELY RECONFIGURABLE REMOTE RADIO HEAD UNIT	Hong Kong	18109794.9	8/16/11	1250427A	12/14/18			Published
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2016-7026899	8/16/11			10-1835254	2/27/18	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	14/479,875	9/8/14	US-2015-0055593-A1		9,826,508	11/21/17	Issued
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	15/786,396	10/17/17	US-2018-0184404-A1				Allowed
NEUTRAL HOST ARCHITECTURE FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	16/406,252	5/8/19					Pending
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	China	201180050052.4	8/16/11	CN 103597807A		ZL 201180050052.4	9/30/15	Issued
REMOTELY CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	European Patent Office	11818695.6	8/16/11	2606571				Published
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Hong Kong	14106888.6	8/16/11	1193522A	8/12/16	HK1193522	8/12/16	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Indonesia	W00 201300983	8/16/11	2015/05508				Published
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	India	1763/CHENP/2013	8/16/11					Published
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Japan	2013-524942	8/16/11	2014-500635		5859538	12/25/15	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Republic of Korea	10-2013-7006776	8/16/11			10-1610447	4/1/16	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Macao	J/1934	8/16/11			J/001934	3/23/16	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	United States of America	13/211,243	8/16/11	US-2012-0039320-A1		8,682,338	3/25/14	Issued

SYSTEM FOR TRANSMITTING SIGNALS AND DISTRIBUTED ANTENNA SYSTEM	China	201510502030.7	8/16/11	CN 105208083A	9/21/18	ZL 201510502030.7	9/21/18	Issued
SYSTEM FOR TRANSMITTING SIGNALS AND DISTRIBUTED ANTENNA SYSTEM	Hong Kong	16105628.1	8/16/11	1217583A	1/13/17			Published
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Japan	2018-124665	8/16/11					Pending
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Macao	J/3488	8/16/11					Pending
REMOTELY RECONFIGUREABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	United States of America	14/169,719	1/31/14	US-2014-0286247-A1		9,419,714	8/16/16	Issued
A METHOD OF OPERATING A DISTRIBUTED ANTENNA SYSTEM AND A METHOD OF COMMUNICATING IN THE SYSTEM	China	201510531485.1	8/16/11	CN 105141513A	12/14/18	ZL 201510531485.1	12/14/18	Issued
METHOD FOR OPERATING A DISTRIBUTED ANTENNA SYSTEM AND METHOD OF COMMUNICATING IN THE SYSTEM	Hong Kong	16105230.1	8/16/11	1217385A	1/6/17			Published
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Japan	2015-245373	8/16/11			6144327	5/19/17	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Republic of Korea	10-2015-7024302	8/16/11			10-1829517	2/8/18	Issued
A METHOD OF OPERATING A DISTRIBUTED ANTENNA SYSTEM AND A METHOD OF COMMUNICATING IN THE SYSTEM	Macao	J/3540	8/16/11					Pending
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	United States of America	14/949,405	11/23/15	US-2016-0080082-A1		9,531,473	12/27/16	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Japan	2017-094314	8/16/11		7/25/18	6364109	7/6/18	Issued

REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	Republic of Korea	10-2018-7003797	8/16/11	20180017234				Published
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	United States of America	15/205,820	7/8/16	US-2017-0070897-A1		9,820,171	11/14/17	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	United States of America	15/391,408	12/27/16	US-2017-0238318-A1		10,159,074	12/18/18	Issued
REMOTELY RECONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHODS	United States of America	16/175,520	10/30/18					Pending
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	China	201180050066.6	8/16/11	CN 103201958A	1/18/17	ZL 201180050066.6	1/18/17	Issued
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	11818697.2	8/16/11	2606576				Published
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Indonesia	W00 201300670	8/16/11					Pending
DAISY CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	India	1856/CHENP/2013	8/16/11					Published
DAISY CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Japan	2013-525983	8/16/11	2013-541875		6005646	9/16/16	Issued
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIDUTED ANTENNA SYSTEM	Republic of Korea	10-2013-7006775	8/16/11			10-1874655	6/28/18	Issued
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Macao	J/2551	8/16/11			J/002551	6/9/17	Issued
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/211,247	8/16/11	US-2012-0039254-A1		8,737,300	5/27/14	Issued
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/913,207	6/7/13	US-2013-0272202-A1		9,148,324	9/29/15	Issued
DAISY-CHAINED RING OF REMOTE UNITS	China	201611139142.1	8/16/11	CN 106921549A				Published

DAISY-CHAINED RING OF REMOTE UNITS	Hong Kong	17112719.6	8/16/11	1238815A	5/4/18			Published
DAISY-CHAINED RING OF REMOTE UNITS	Macao							Unfiled
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	United States of America	14/260,145	4/23/14	US-2014-0313884-A1		9,137,078	9/15/15	Issued
A METHOD OF COMMUNICATING IN A DISTRIBUTED ANTENNA SYSTEM	China	201610011597.9	8/16/11	CN105634585A				Allowed
A METHOD OF COMMUNICATING IN A DISTRIBUTED ANTENNA SYSTEM	Hong Kong	16112531.3	8/16/11	1224444A	8/18/17			Published
A METHOD AND SYSTEM FOR ROUTING AND SWITCHING SIGNALS	Indonesia	P00201801237	8/16/11					Pending
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Japan	2016-139702	8/16/11			6405342	9/21/18	Issued
A METHOD OF COMMUNICATING IN A DISTRIBUTED ANTENNA SYSTEM	Macao							Unfiled
DISTRIBUTED ANTENNA SYSTEM	United States of America	14/800,515	7/15/15	US-2016-0014782-A1		9,419,837	8/16/16	Issued
TRANSPORT OF WIRELESS COMMUNICATIONS	China	201611138820.2	8/16/11	CN 106850735A				Published
WIRELESS COMMUNICATION TRANSMISSION	Hong Kong	17111546.7	8/16/11	1238016A	4/20/18			Published
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Indonesia	P00201703225	8/16/11	2018/00031				Published
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Japan	2016-174930	8/16/11			6463707	1/11/19	Issued
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2018-7018518	8/16/11	20180078335		10-1947975	2/7/19	Issued
TRANSPORT OF WIRELESS COMMUNICATIONS	Macao							Unfiled
DISTRIBUTED ANTENNA SYSTEM	United States of America	15/223,819	7/29/16	US-2017-0055198-A1		10,080,178	9/18/18	Issued

DIGITAL REMOTE UNITS IN A DISTRIBUTED ANTENNA SYSTEM	China	201611138760.4	8/16/11	CN 107018055A				Published
DIGITAL REMOTE UNIT IN DISTRIBUTED ANTENNA SYSTEM	Hong Kong	17113376.8	8/16/11	1239987A	5/11/18			Published
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Japan	2019-000096	8/16/11					Pending
DAISY-CHAINED RING OF REMOTE UNITS FOR A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2019-7003593	8/16/11	20190015636				Published
DIGITAL REMOTE UNITS IN A DISTRIBUTED ANTENNA SYSTEM	Macao							Unfiled
DISTRIBUTED ANTENNA SYSTEM	United States of America	16/059,434	8/9/18	US-2019-0110239-A1				Allowed
TRANSPORT OF WIRELESS COMMUNICATIONS	China	201611139152.5	8/16/11	CN 107104869A				Published
WIRELESS COMMUNICATION TRANSMISSION	Hong Kong	18100385.3	8/16/11	1241165A	6/1/18			Published
TRANSPORT OF WIRELESS COMMUNICATIONS	Macao							Unfiled
DISTRIBUTED ANTENNA SYSTEM	United States of America	16/410,860	5/13/19					Pending
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	China	201280042828.2	9/4/12	CN 103999436A	8/24/16	ZL 201280042828.2	8/24/16	Issued
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	European Patent Office	12827424.8	9/4/12	2749123				Published
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	Hong Kong	15101013.4	9/4/12	1200622A	10/20/17	HK1200622	10/20/17	Issued
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	Macao	J/2359	9/4/12			J/002359	2/14/17	Issued
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	United States of America	13/602,818	9/4/12	US-2014-0072064-A1		8,817,848	8/26/14	Issued

SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	United States of America	14/333,277	7/16/14	US-2015-0078471-A1		9,148,203	9/29/15	Issued
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR REDUCING UPLINK NOISE	United States of America	14/831,626	8/20/15	US-2015-0358054-A1		9,954,585	4/24/18	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	China	201280045910.0	9/24/12	CN 103858337A	5/3/17	ZL 201280045910.0	5/3/17	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	Hong Kong	14109157.4	9/24/12	1195829A	4/27/18	HK1195829	4/27/18	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	Japan	2014-532074	9/24/12	2014-526863		6080854	1/27/17	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	Republic of Korea	10-2014-7010583	9/24/12					Allowed
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	Macao	J/1529	9/24/12			J/001529	6/23/17	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	13/625,760	9/24/12	US-2013-0077713-A1		8,873,674	10/28/14	Issued

SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	14/480,267	9/8/14	US-2014-0376661-A1		9,197,259	11/24/15	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	14/918,371	10/20/15	US-2016-0191087-A1		10,256,853	4/9/19	Issued
SYSTEM AND METHOD FOR INCREASING BANDWIDTH FOR DIGITAL PREDISTORTION IN MULTI-CHANNEL WIDEBAND COMMUNICATION SYSTEMS	United States of America	16/279,535	2/19/19					Pending
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR BANDWIDTH COMPRESSION AND TRANSPORT OF SIGNALS IN NONCONTIGUOUS FREQUENCY BLOCKS	United States of America	13/686,036	11/27/12	US-2014-0010168-A1		8,724,664	5/13/14	Issued
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR BANDWIDTH COMPRESSION AND TRANSPORT OF SIGNALS IN NONCONTIGUOUS FREQUENCY BLOCKS	United States of America	14/225,673	3/26/14	US-2014-0206282-A1		9,236,897	1/12/16	Issued
SOFTWARE CONFIGURABLE DISTRIBUTED ANTENNA SYSTEM AND METHOD FOR BANDWIDTH COMPRESSION AND TRANSPORT OF SIGNALS IN NONCONTIGUOUS FREQUENCY BLOCKS	United States of America	14/960,177	12/4/15	US-2016-0226784-A1		9,722,939	8/1/17	Issued
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United Arab Emirates	471/2014	11/6/12					Pending
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Australia	2012336027	11/6/12		4/13/17	2012336027	7/28/17	Issued

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SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Brazil	BR 11 2014 010895 1	11/6/12					Pending
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	China	201280066105.6	11/6/12	CN 104040368A	8/22/17	ZL 201280066105.6	8/22/17	Issued
RESOURCE ALLOCATION IN A DISTRIBUTED ANTENNA SYSTEM	Germany	12847270.1	11/6/12	EP 2776857 A1		60 2012 047 724.5	6/20/18	Issued
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Eurasian Patent Office	201400556	11/6/12					Pending
RESOURCE ALLOCATION IN A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	12847270.1	11/6/12	EP 2776857 A1	6/20/18	2776857	6/20/18	Issued
RESOURCE ALLOCATION IN A DISTRIBUTED ANTENNA SYSTEM	France	12847270.1	11/6/12	EP 2776857 A1		2776857	6/20/18	Issued
RESOURCE ALLOCATION IN A DISTRIBUTED ANTENNA SYSTEM	United Kingdom	12847270.1	11/6/12	EP 2776857 A1		2776857	6/20/18	Issued
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Hong Kong	15101263.1	11/6/12	1200916A	7/13/18	HK1200916	7/13/18	Issued
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Indonesia	P00 2014 03239	11/6/12	2015/04205				Published
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Israel	232439	11/6/12		4/30/19			Pending
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	India	4237/CHENP/2014	11/6/12					Published
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Japan	2014-540195	11/6/12	2014-534783		6101277	3/3/17	Issued
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2014-7015429	11/6/12					Pending
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Macao	J/2816	11/6/12			J/002816	2/12/18	Issued
RESOURCE ALLOCATION IN A DISTRIBUTED ANTENNA SYSTEM	Netherlands	12847270.1	11/6/12	EP 2776857 A1		2776857	6/20/18	Issued

SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Singapore	11201402105S	11/6/12			11201402105S	7/26/16	Issued
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	13/670,162	11/6/12	US-2013-0114963-A1				Published
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Australia	2017204786	11/6/12					Pending
SOFT HAND-OFF AND ROUTING DATA IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	China	201710619658.4	11/6/12	CN 107529172A				Published
SOFT HAND-OFF IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	European Patent Office	18178591.6	11/6/12	3445078				Published
SOFT HAND-OFF AND ROUTING DATA IN VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Hong Kong	18106058.6	11/6/12	1247019A	9/14/18			Published
VIRTUALIZED WIRELESS NETWORK	United Arab Emirates	472/2014	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK	Australia	2012336026	11/6/12		7/21/16	2012336026	11/3/16	Issued
VIRTUALIZED WIRELESS NETWORK	Brazil	11 2014 011034 4	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK	China	201280066289.6	11/6/12	CN 104081795B	12/21/18	ZL 201280066289.6	12/21/18	Issued
VIRTUALIZED WIRELESS NETWORK	Eurasian Patent Office	201400555	11/6/12	201400555				Published
VIRTUALIZED WIRELESS NETWORK	European Patent Office	12848304.7	11/6/12	EP 2777302				Published
VIRTUALIZED WIRELESS NETWORK	Hong Kong	15102186.3	11/6/12	1202012A	9/11/15			Published
VIRTUALIZED WIRELESS NETWORK	Indonesia	P00 2014 03237	11/6/12	2015/03305				Allowed
VIRTUALIZED WIRELESS NETWORK	Israel	232438	11/6/12			232438	7/31/18	Issued
VIRTUALIZED WIRELESS NETWORK	India	4232/CHENP/2014	11/6/12	2014CN04232				Published
VIRTUALIZED WIRELESS NETWORK	Japan	2014-540194	11/6/12	2015-505427		6158818	6/16/17	Issued
VIRTUALIZED WIRELESS NETWORK	Republic of Korea	10-2014-7015432	11/6/12					Pending

VIRTUALIZED WIRELESS NETWORK	Macao	J/1714	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK	Malaysia	PI 2014001321	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK	Singapore	11201402104T	11/6/12			11201402104T	2/2/18	Issued
VIRTUALIZED WIRELESS NETWORK	United States of America	13/670,290	11/6/12	US-2013-0128810-A1		10,264,626	4/16/19	Issued
VIRTUALIZED WIRELESS NETWORK	China	201811416669.3	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK	Japan	2017-113169	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK	Singapore	10201800761X	11/6/12	10201800761X				Published
VIRTUALIZED WIRELESS MESH NETWORK	United States of America	15/857,356	12/28/17	US-2018-0249532-A1				Published
VIRTUALIZED WIRELESS NETWORK	Australia	2018247240	11/6/12					Pending
VIRTUALIZED WIRELESS NETWORK WITH PILOT BEACONS	United States of America	13/671,203	11/7/12	US-2013-0114486-A1		9,420,628	8/16/16	Issued
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Brazil	BR 11 2014 018841 6	1/31/13					Pending
A SYSTEM FOR ROUTING SIGNALS IN A DISTRIBUTED ANTENNA SYSTEM	China	201380007517.7	1/31/13	CN 104221293A	2/22/17	ZL 201380007517.7	2/22/17	Issued
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	European Patent Office	13744144.0	1/31/13	2 810 373				Published
SYSTEM FOR ROUTING SIGNALS IN A DISTRIBUTED ANTENNA SYSTEM	Hong Kong	15104338.6	1/31/13	1204164A	3/29/18	HK1204164	3/29/18	Issued
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Israel	233785	1/31/13					Pending
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	India	5859/CHENP/2014	1/31/13	2014CN05859				Published
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Japan	2014-554989	1/31/13			6193265	8/18/17	Issued

DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2014-7024349	1/31/13					Pending
A SYSTEM FOR ROUTING SIGNALS IN A DISTRIBUTED ANTENNA SYSTEM	Macao	J/2563	1/31/13			J/002563	6/23/17	Issued
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	13/754,702	1/30/13	US-2014-0037292-A1		9,025,956	5/5/15	Issued
DATA TRANSMISSION IN VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Hong Kong	17113429.5	1/31/13	1239969A	5/11/18			Published
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Japan	2017-154789	1/31/13					Pending
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	14/678,779	4/3/15	US-2015-0326957-A1		9,621,971	4/11/17	Issued
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	15/445,467	2/28/17	US-2017-0303019-A1		10,051,350	8/14/18	Issued
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	16/039,182	7/18/18	US-2019-0082243-A1				Published
FREQUENCY TRANSLATION IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	13/753,288	1/29/13	US-2014-0036770-A1		9,723,612	8/1/17	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	Brazil	BR 11 2014 020305 9	2/19/13					Pending
METHODS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	China	201380009723.1	2/19/13	CN104160725A	5/1/18	ZL 201380009723.1	5/1/18	Issued
EVOLUTIONARY ALOGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	Germany	13749837.4	2/19/13	2815591		60 2013 025 498.2	8/23/17	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	13749837.4	2/19/13	2815591	8/23/17	2815591	8/23/17	Issued

EVOLUTIONARY ALOGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	France	13749837.4	2/19/13	2815591		2815591	8/23/17	Issued
EVOLUTIONARY ALOGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	United Kingdom	13749837.4	2/19/13	2815591		2815591	8/23/17	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	Hong Kong	15103517.1	2/19/13	1203022A	10/9/15			Published
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	Israel	233975	2/19/13		4/30/18	233975	7/31/18	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	India	6777/DELNP/2014	2/19/13	2014DN06777				Published
DATA TRANSPORT IN A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	Japan	2014-557866	2/19/13			6320939	4/13/18	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2014-7025637	2/19/13					Pending
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	Macao	J/3166	2/19/13			J/003166	10/9/18	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/770,113	2/19/13	US-2014-0057627-A1		9,148,839	9/29/15	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA	European Patent Office	17185342.7	2/19/13	3258722				Published

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EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	United States of America	14/837,850	8/27/15	US-2016-0073313-A1		9,854,494	12/26/17	Issued
EVOLUTIONARY ALGORITHMS FOR GEOGRAPHIC LOAD BALANCING USING A DISTRIBUTED ANTENNA SYSTEM	United States of America	15/782,309	10/12/17	US-2018-0160356-A1				Published
HYBRID DATA TRANSPORT FOR A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	13/777,185	2/26/13	US-2014-0072299-A1		9,537,572	1/3/17	Issued
HYBRID DATA TRANSPORT FOR A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	15/383,121	12/19/16	US-2017-0104538-A1		10,063,319	8/28/18	Issued
HYBRID DATA TRANSPORT FOR A VIRTUALIZED DISTRIBUTED ANTENNA SYSTEM	United States of America	16/054,678	8/3/18	US-2019-0036606-A1				Published
METHOD AND SYSTEM FOR SOFT FREQUENCY REUSE IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/894,309	5/14/13	US-2014-0233468-A1		9,197,358	11/24/15	Issued
METHOD AND SYSTEM FOR SOFT FREQUENCY REUSE IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	14/887,922	10/20/15	US-2016-0113014-A1		9,538,536	1/3/17	Issued
METHOD AND SYSTEM FOR SOFT FREQUENCY REUSE IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	15/383,431	12/19/16	US-2017-0230836-A1		9,942,771	4/10/18	Issued
METHOD AND SYSTEM FOR SOFT FREQUENCY REUSE IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	15/912,859	3/6/18	US-2018-0332477-A1				Allowed
METHOD AND SYSTEM FOR SOFT FREQUENCY REUSE IN A DISTRIBUTED ANTENNA SYSTEM	United States of America							Unfiled
SELF-OPTIMIZING DISTRIBUTED ANTENNA SYSTEM USING SOFT FREQUENCY REUSE	United States of America	13/935,157	7/3/13	US-2014-0161057-A1		9,363,768	6/7/16	Issued
SELF-OPTIMIZING DISTRIBUTED ANTENNA SYSTEM USING SOFT FREQUENCY REUSE	United States of America	15/154,073	5/13/16	US-2017-0013568-A1		9,769,766	9/19/17	Issued
SELF-OPTIMIZING DISTRIBUTED ANTENNA SYSTEM USING SOFT FREQUENCY REUSE	United States of America	15/676,631	8/14/17	US-2018-0092045-A1				Allowed

METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Brazil	BR 11 2015 001348 1	7/18/13					Pending
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	China	201380039353.6	7/18/13	CN 104584501A				Allowed
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	European Patent Office	13823723.5	7/18/13	2875620				Published
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Hong Kong	15108803.3	7/18/13	1208291A	2/26/16			Published
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Israel	236619	7/18/13		8/30/18	236619	12/1/18	Issued
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	India	211/CHENP/2015	7/18/13	2015CN00211				Published
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Japan	2015-524332	7/18/13	2015-525036				Allowed

METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Republic of Korea	10-2015-7004064	7/18/13					Pending
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Macao							Unfiled
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	United States of America	13/945,736	7/18/13	US-2014-0159810-A1		9,225,296	12/29/15	Issued
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	Israel	259447	7/18/13					Pending
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	United States of America	14/956,040	12/1/15	US-2016-0344351-A1		10,263,569	4/16/19	Issued
METHOD AND SYSTEM FOR ALIGNING SIGNALS WIDELY SPACED IN FREQUENCY FOR WIDEBAND DIGITAL PREDISTORTION IN WIRELESS COMMUNICATION SYSTEMS	United States of America	16/352,065	3/13/19					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	United Arab Emirates	125/2015	7/26/13					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Australia	2013296819	7/26/13		8/31/17	2013296819	12/18/17	Issued

OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Brazil	BR 11 2015 001916 1	7/26/13					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	China	201380040757.7	7/26/13	CN 104956732B	4/30/19	ZL 201380040757.7	4/30/19	Issued
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Eurasian Patent Office	201500184	7/26/13					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	13825612.8	7/26/13	2880888				Published
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Hong Kong	16101919.8	7/26/13	1214067A	7/15/16			Published
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Indonesia	P00201500998	7/26/13					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Israel	236631	7/26/13			236631	12/1/18	Issued
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	India	244/CHENP/2015	7/26/13					Published
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Japan	2015-525473	7/26/13		8/15/18	6373837	7/27/18	Issued
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2015-7004047	7/26/13					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Macao							Unfiled
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Malaysia	PI 2015000254	7/26/13					Pending
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Singapore	11201500770U	7/26/13			11201500770U	5/22/17	Issued
OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/950,160	7/24/13	US-2014-0162664-A1				Published

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OPTIMIZATION OF TRAFFIC LOAD IN A DISTRIBUTED ANTENNA SYSTEM	Australia	2017268613	7/26/13					Pending
A SYSTEM FOR DYNAMICALLY ROUTING SIGNALS	China	201910237775.3	7/26/13					Pending
TIME SYNCHRONIZED ROUTING IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	13/960,346	8/6/13	US-2014-0162713-A1		9,439,242	9/6/16	Issued
TIME SYNCHRONIZED ROUTING IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	15/251,293	8/30/16	US-2017-0118734-A1		10,045,314	8/7/18	Issued
TIME SYNCHRONIZED ROUTING IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	16/038,613	7/18/18	US-2019-0082407-A1				Published
POWER AMPLIFIER PROTECTION USING A CYCLIC REDUNDANCY CHECK ON THE DIGITAL TRANSPORT OF DATA	United States of America	14/095,706	12/3/13	US-2014-0223266-A1		9,559,806	1/31/17	Issued
DAS INTEGRATED DIGITAL OFF-AIR REPEATER	United States of America	14/044,668	10/2/13	US-2014-0169263-A1		9,112,549	8/18/15	Issued
DAS INTEGRATED DIGITAL OFF-AIR REPEATER	United States of America	14/743,789	6/18/15	US-2016-0007264-A1		9,622,148	4/11/17	Issued
DAS INTEGRATED DIGITAL OFF-AIR REPEATER	United States of America	16/230,253	12/21/18					Pending
WIDE BANDWIDTH DIGITAL PREDISTORTION SYSTEM WITH REDUCED SAMPLING RATE	United States of America	13/777,194	2/26/13	US-2014-0241461-A1		8,913,689	12/16/14	Issued
WIDE BANDWIDTH DIGITAL PREDISTORTION SYSTEM WITH REDUCED SAMPLING RATE	United States of America	14/552,231	11/24/14	US-2015-0180519-A1		9,258,022	2/9/16	Issued
WIDE BANDWIDTH DIGITAL PREDISTORTION SYSTEM WITH REDUCED SAMPLING RATE	United States of America	14/987,093	1/4/16	US-2016-0261294-A1		9,673,848	6/6/17	Issued
WIDE BANDWIDTH DIGITAL PREDISTORTION SYSTEM WITH REDUCED SAMPLING RATE	United States of America	15/492,902	4/20/17	US-2017-0353199-A1		10,218,392	2/26/19	Issued
WIDE BANDWIDTH DIGITAL PREDISTORTION SYSTEM WITH REDUCED SAMPLING RATE	United States of America	16/240,433	1/4/19					Pending
INDOOR LOCALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	14/168,328	1/30/14	US-2014-0313075-A1		9,671,496	6/6/17	Issued

INDOOR LOCALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	15/582,776	5/1/17	US-2017-0363743-A1		10,180,497	1/15/19	Issued
INDOOR LOCALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	16/205,567	11/30/18					Pending
FEEDBACK BASED INDOOR LOCALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	14/171,600	2/3/14	US-2014-0306841-A1		9,476,984	10/25/16	Issued
FEEDBACK BASED INDOOR LOCALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	15/279,136	9/28/16	US-2017-0146662-A1				Allowed
INDOOR LOCALIZATION USING ANALOG OFF-AIR ACCESS UNITS	United States of America	14/183,297	2/18/14	US-2014-0320340-A1				Published
METHOD AND SYSTEM FOR WI-FI DATA TRANSMISSION	United States of America	14/189,044	2/25/14	US-2014-0314061-A1		9,955,361	4/24/18	Issued
METHOD AND SYSTEM FOR WI-FI DATA TRANSMISSION	United States of America	15/907,153	2/27/18	US-2018-0324599-A1				Published
INDOOR TRILATERALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	14/199,617	3/6/14	US-2014-0313076-A1		9,958,548	5/1/18	Issued
INDOOR TRILATERALIZATION USING DIGITAL OFF-AIR ACCESS UNITS	United States of America	15/917,342	3/9/18	US-2018-0329068-A1				Published
REAL-TIME LOCATING SYSTEM USING GPS TIME DIFFERENCE OF ARRIVAL WITH DIGITAL OFF-AIR ACCESS UNITS AND REMOTE UNITS	United States of America	14/257,209	4/21/14	US-2014-0340255-A1		9,851,445	12/26/17	Issued
REAL-TIME LOCATING SYSTEM USING GPS TIME DIFFERENCE OF ARRIVAL WITH DIGITAL OFF-AIR ACCESS UNITS AND REMOTE UNITS	United States of America	15/819,279	11/21/17	US-2018-0239025-A1				Published
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Brazil	BR 11 2016 014197 0	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	China	201480069382.1	12/18/14	CN 105830373B	4/23/19	ZL 201480069382.1	4/23/19	Issued
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	European Patent Office	14872389.3	12/18/14	3084992				Published

DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Hong Kong	17100236.5	12/18/14	1226878A				Published
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Indonesia	P00201604728	12/18/14	2017/10943				Published
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Israel	246210	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	India	201617023992	12/18/14					Published
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Japan	2016-541192	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Republic of Korea	10-2016-7019353	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Macao							Unfiled
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Malaysia	PI 2016001132	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Singapore	11201605002Q	12/18/14					Allowed
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	United States of America	14/574,071	12/17/14	US-2015-0207545-A1		9,847,816	12/19/17	Issued
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Australia	2019202190	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	China	201910227542.5	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	Singapore	10201904722T	12/18/14					Pending
DIGITAL TRANSPORT OF DATA OVER DISTRIBUTED ANTENNA NETWORK	United States of America	15/812,018	11/14/17	US-2018-0212650-A1				Allowed

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NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Brazil	BR 11 2016 015642 0	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	China	201580003669.9	1/6/15	CN 105874824A				Published
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	European Patent Office	15733064.8	1/6/15	3092832				Published
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Hong Kong	17100234.7	1/6/15	1226892A				Published
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Indonesia	P00 2016 05228	1/6/15	2017/10346				Published
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Israel	246326	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	India	201617024698	1/6/15					Published
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Japan	2016-562732	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Republic of Korea	10-2016-7020351	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Malaysia	PI 2016001173	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Singapore	11201605464T	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	United States of America	14/590,447	1/6/15	US-2015-0303999-A1				Allowed
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Australia	2019202185	1/6/15					Pending
NETWORK SWITCH FOR A DISTRIBUTED ANTENNA NETWORK	Singapore	10201805615W	1/6/15	10201805615W				Published

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DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	United States of America	14/580,585	12/23/14	US-2015-0303998-A1				Published
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Brazil	BR 11 2016 014663 8	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	China	201480070750.4	12/23/14	CN 105917675A				Published
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	14874737.1	12/23/14	3087762				Published
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Hong Kong	17100988.5	12/23/14	1227599A				Published
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Indonesia	P00201604818	12/23/14	2017/09815				Published
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Israel	246242	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	India	201617024316	12/23/14					Published
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Japan	2016-560881	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2016-7020070	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Malaysia	PI 2016001159	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Singapore	11201605115V	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	United States of America							Unfiled
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Australia	2019202115	12/23/14					Pending
DIGITAL MULTIPLEXER IN A DISTRIBUTED ANTENNA SYSTEM	Singapore	10201805212Y	12/23/14	10201805212Y				Published
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Australia	2015218375	2/13/15					Pending
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Switzerland	15749690.2	2/13/15	3105968		3105968	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	China	201580008198.0	2/13/15	CN 105993139A				Published

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SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Germany	15749690.2	2/13/15	3105968		602015020944.3	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	European Patent Office	15749690.2	2/13/15	3105968	12/5/18	3105968	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Spain	15749690.2	2/13/15	3105968		3105968	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	France	15749690.2	2/13/15	3105968		3105968	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	United Kingdom	15749690.2	2/13/15	3105968		3105968	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Hong Kong	17102313.7	2/13/15	1229081A	11/10/17			Published
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Japan	2016-551758	2/13/15					Pending
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Macao							Unfiled
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	Netherlands	15749690.2	2/13/15	3105968		3105968	12/5/18	Issued
SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	United States of America	14/621,192	2/12/15	US-2015-0304044-A1		10,284,296	5/7/19	Issued

SYSTEM AND METHOD FOR PERFORMANCE OPTIMIZATION IN AND THROUGH A DISTRIBUTED ANTENNA SYSTEM	United States of America	16/360,980	3/21/19					Pending
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Australia	2015227155	3/5/15					Pending
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Brazil	BR 11 2016 020285 6	3/5/15					Pending
DISTRIBUTED ANTENNA SYSTEM WITH REMOTE RADIO HEADS	China	201580011639.2	3/5/15	CN 106170932A				Allowed
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	European Patent Office	15758873.2	3/5/15	3114780				Published
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Hong Kong	17104046.7	3/5/15	1230802A	12/8/17			Published
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Israel	247415	3/5/15					Pending
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	India	201617029173	3/5/15	201617029173				Published
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Japan	2016-555465	3/5/15					Pending
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Republic of Korea	10-2016-7027525	3/5/15					Pending
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	Macao							Unfiled
DISTRIBUTED RADIO SYSTEM WITH REMOTE RADIO HEADS	United States of America	14/639,418	3/5/15	US-2015-0256358-A1				Published
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Australia	2016244115	4/4/16	2016244115				Published
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Brazil	BR1120170211440	4/4/16					Pending
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	China	201680030803.9	4/4/16	CN 107850631 A				Published
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	European Patent Office	16774416.8	4/4/16	3278122				Published
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Hong Kong	18106961.2	4/4/16					Pending

METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Indonesia	PID201707729	4/4/16	2018/05650				Published
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	India	201717038921	4/4/16	201717038921				Published
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Japan	2017-551651	4/4/16					Pending
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE TDD ARCHITECTURE	Republic of Korea	10-2017-7032015	4/4/16					Pending
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Macao							Unfiled
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	Singapore	11201708119W	4/4/16					Pending
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	United States of America	15/090,402	4/4/16	US-2016-0360500-A1		9,854,553	12/26/17	Issued
METHOD AND SYSTEM FOR LINK SYNCHRONIZATION IN AN LTE-TDD ARCHITECTURE	United States of America	15/820,299	11/21/17	US-2018-0227870-A1				Published
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Australia	2016289947	7/6/16	2016289947				Published
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Brazil	BR 11 2018 000161 9	7/6/16					Pending
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	China	201680051423.3	7/6/16	CN 108450059 A				Published
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	European Patent Office	16821901.2	7/6/16	3320369				Published
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Hong Kong	18113025.2	7/6/16					Pending
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Israel	256721	7/6/16					Pending
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	India	201817003865	7/6/16	201817003865				Published
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Japan	2018-500520	7/6/16	2018524929				Published
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Republic of Korea	10-2018-7003658	7/6/16					Pending

DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Macao							Unfiled
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	Singapore	11201800110P	7/6/16					Pending
DISTRIBUTED ANTENNA SYSTEM NETWORK ANALYTICS	United States of America	15/203,015	7/6/16	US-2017-0013585-A1				Published
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	Australia	2016357315	11/21/16	2016357315				Published
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	China	2016800795294	11/21/16	CN 108604912 A				Published
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	European Patent Office	16867324.2	11/21/16	3378167				Published
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	Hong Kong	18113803.0	11/21/16					Pending
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	Macao							Unfiled
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	Singapore	11201804193X	11/21/16					Pending
VIRTUAL RADIO ACCESS NETWORK USING SOFTWARE-DEFINED NETWORK OF REMOTES AND DIGITAL MULTIPLEXING SWITCHES	United States of America	15/358,060	11/21/16	US-2017-0250927-A1				Published

REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	Australia	2017261802	5/12/17					Pending
REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	China	2017800434163	5/12/17					Pending
REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	European Patent Office	17796989.6	5/12/17	3456115				Published
REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	Japan	2018-559301	5/12/17					Pending
REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	Republic of Korea	10-2018-7035997	5/12/17					Pending
REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	Singapore	11201809610Y	5/12/17					Pending
REDUNDANCY IN A PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM	United States of America	15/594,323	5/12/17	US-2017-0366268-A1				Published

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PTO/AIA/80 (07-17)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 167137

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(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 167137

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Dali Wireless, Inc.
535 Middlefield Road
Menlo Park, CA 94025

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature	Date December 13, 2019
Name Albert Lee, Ph.D.	Telephone
Title Founder, Chairman and Chief Executive Officer	

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 update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 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:	38533330
Application Number:	16059434
International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	27076
Filer:	Jason Vick/Joanne Vos
Filer Authorized By:	Jason Vick
Attorney Docket Number:	091172-1100459-102450US
Receipt Date:	09-FEB-2020
Filing Date:	09-AUG-2018
Time Stamp:	13:03:10
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		Statement_Under_373c_w_POA_10333-22-CON-5.pdf	1629671 bbc893d0d0691af493adb5aa80966f6595b2032f	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Assignee showing of ownership per 37 CFR 3.73	1	2
	Power of Attorney	3	3
Warnings:			
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	Total Files Size (in bytes):	1629671	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: DALI WIRELESS, INC.

Application No./Patent No.: 16/059,434 Filed/Issue Date: August 9, 2018

Titled: DISTRIBUTED ANTENNA SYSTEM

DALI WIRELESS, INC., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Shawn Patrick Stapleton, Paul Lemson, Bin Lin To: DALI SYSTEMS CO. LTD.

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2. From: Albert S. Lee To: DALI SYSTEMS CO. LTD.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: DALI SYSTEMS CO. LTD. To: DALI WIRELESS, INC.

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4. From: DALI SYSTEMS CO. LTD. To: DALI WIRELESS, INC.

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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Jason H. Vick/	February 9, 2020
Signature	Date
Jason H. Vick	45,285
Printed or Typed Name	Title or Registration Number

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

167137
SHERIDAN ROSS PC
1560 Broadway
Suite 1200
Denver, CO 80202

POA ACCEPTANCE LETTER

OC000000114645696

Date Mailed: 02/12/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/09/2020.

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

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

/zretta/

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	091172-1100459-102450US

CONFIRMATION NO. 2049

27076
DORSEY & WHITNEY LLP - SEATTLE
INTELLECTUAL PROPERTY DEPARTMENT
COLUMBIA CENTER
701 FIFTH AVENUE, SUITE 6100
SEATTLE, WA 98104-7043

POWER OF ATTORNEY NOTICE

OC000000114645650

Date Mailed: 02/12/2020

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/09/2020.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

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

/zretta/

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

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 For The District Of Delaware on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	12/30/2019	For The District Of Delaware

PLAINTIFF	DEFENDANT
DALI WIRELESS, INC. a Delaware corporation	JOHN MEZZALINGUA ASSOCIATES, LLC d/b/a JMA Wireless, a Delaware limited liability company

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	US 10,334,499 B2	6/25/2019	Dali Wireless, Inc.
2	US 9,820,171 B2	11/14/2017	Dali Wireless, Inc.
3			
4			
5			

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

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

Trials@uspto.gov
Tel: 571-272-7822

Paper 15
Entered: February 9, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JOHN MEZZALINGUA ASSOCIATES, LLC,
Petitioner,

v.

DALI WIRELESS INC.,
Patent Owner.

Case IPR2020-01430
Patent 10,334,499 B2

Before KARL D. EASTHOM, MELISSA A. HAAPALA, and SHARON FENICK, *Administrative Patent Judges*.

FENICK, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background

John Mezzalingua Associates, LLC ("Petitioner") filed a Petition to institute an *inter partes* review of claims 1–19 ("challenged claims") of U.S. Patent No. 10,334,499 B2 (Ex. 1001, "the '499 patent") pursuant to 35 U.S.C. §§ 311–319. Paper 3 ("Pet."). Dali Wireless Inc. ("Patent Owner") filed a Preliminary Response. Paper 10 ("Prelim. Resp."). With our authorization (Paper 11), Petitioner filed a Reply relating to our discretion under 35 U.S.C. § 314(a), Paper 12 ("Reply"), and Patent Owner filed a Sur-Reply, Paper 14 ("Sur-Reply"). We have authority under 35 U.S.C. § 6(b)(4) and 35 U.S.C. § 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

Upon consideration of the Petition, Preliminary Response, and additional briefing we decline to exercise discretion to deny institution under 35 U.S.C. § 314(a), and we determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one challenged claim of the '499 patent. Accordingly, for the reasons that follow, we do not institute *inter partes* review.

B. Real Parties in Interest

Petitioner indicates that John Mezzalingua Holdings, LLC, JMA Wireless LTD, Teko Telecom Srl, XRN, LLC, and CellH, LLC are

additional real parties in interest. Pet. 1. Patent Owner indicates no additional real parties in interest. Paper 5, 1.

C. Related Proceedings

The parties inform us that the '499 patent was asserted against Petitioner in the following district court case: *Dali Wireless, Inc. v. John Mezzalingua Associates, LLC d/b/a JMA Wireless*, 1:19-cv-02367-RGA (D. Del.) ("the related district court proceeding"). Pet. 1; Paper 5, 1. Petitioner additionally describes a concurrently-filed petition for *inter partes* review for U.S. Patent No. 9,820,171 B2 as a related matter. Pet. 1 (referring to IPR2020-01432).

D. The '499 Patent

The '499 patent is titled "Distributed Antenna System" and relates to a Distributed Antenna System (DAS) that "enables a high degree of flexibility to manage, control, enhance, [and] facilitate the usage and performance of a distributed wireless network." Ex. 1001, codes (54), (57). According to one embodiment of the invention, a distributed antenna system includes a digital access unit (DAU), which connects to associated base stations. *Id.* at 4:40–44. The distributed antenna system receives downlink data via radio frequency (RF) signals from a base station. *Id.* at 4:63–65. The DAUs provide the received signals to multiple digital remote units (DRUs). *Id.* at 4:41–44, 5:4–9.

Figure 1 of the '499 patent, reproduced below, is a block diagram showing the basic structure and an example of a downlink (base station to DRU) transport scenario.

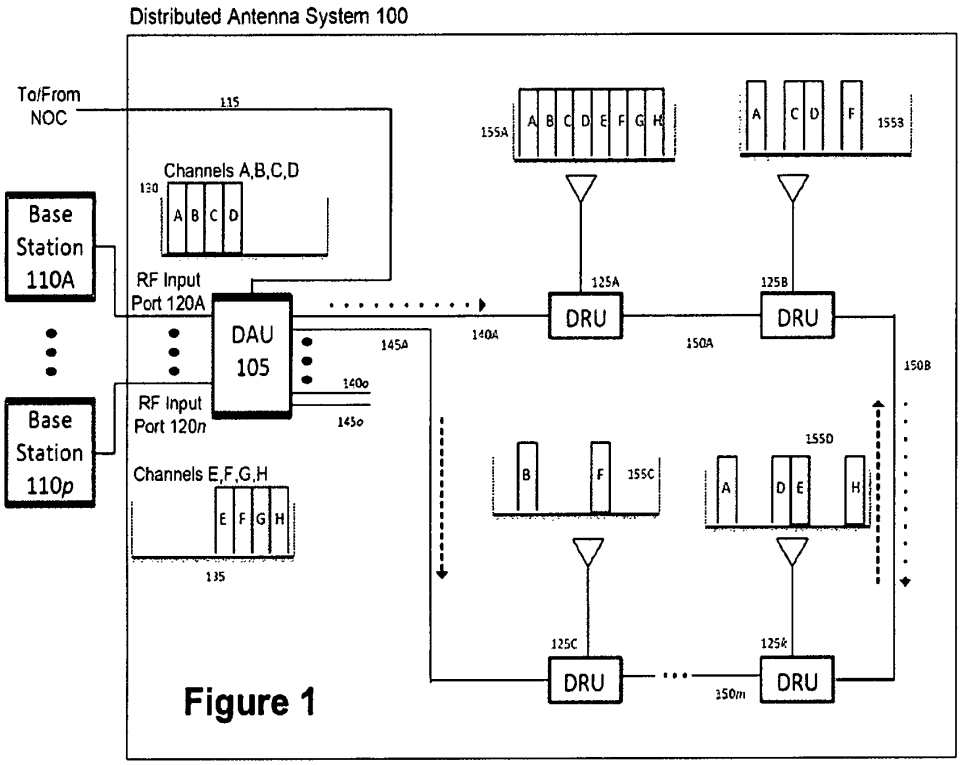


Figure 1

Figure 1 depicts DAU 105, which provides signals to DRUs 125A, 125B, 125C, through 125*k*. *Id.* at 4:41–44, 4:62–5:6. DAU 105 receives composite downlink input signal 130, containing carriers[1] A–D, from base

[1] Elements A–H are alternatively referred to as "carriers" and as "channels" in the '499 patent. *Compare* Ex. 1001 at 5:20–28, 7:61–65, 8:46–49, Fig. 1 (describing A–H as channels) *with id.* at 5:65–6:2, 6:18–26, 6:34–38, 6:45–49, 7:23–25, 7:47–50, (describing A–H as carriers); *see also id.* at 5:34–36, 5:45–52, 7:63–8:2. The '499 patent additionally specifies that "a wireless operator may have more than one RF carrier per channel allocated to a single base station" and describes Figure 1 and the related disclosure as explaining the situation where composite downlink signal 130 from a first base station comprises carriers A–D. *Id.* at 5:53–66. We use "carriers" in this section to refer to A–H.

station 110a. *Id.* at 5:62–66. DAU 105 receives second composite downlink input signal 135, containing carriers E–H, from base station 110p. *Id.* at 5:66–6:2. DRUs 125A, 125B, 125C, through 125*k*. DRUs 125A–k are connected in a ring configuration via bidirectional optical cables, and the downlinked carriers are propagated around the ring, or alternatively, in a daisy change configuration, to provide all carriers to all DRUs 125A–k. *Id.* at 4:35–39, 5:4–9, 5:20–31, 6:9–20, 6:63–7:2. While the exemplary embodiment of Figure 1 shows all carriers arriving at each DRU, "the number of channels received at each DRU is assigned by the DAU and need not be equal, adjacent or sequential, but instead will typically be any configuration that optimizes network utilization." *Id.* at 5:28–31.

Generally, software settings within a DRU are configured either manually or automatically to determine which of the carriers received at the DRU are present in the downlink output signal at the antenna port of the DRU. *Id.* at 6:21–27. In one embodiment, the DAU monitors which carriers and corresponding time slots are active for each DRU. *Id.* at 12:15–17. The DAU communicates with a software module in the DRU to enable or disable the transmission of specific radio resources by the DRU. *Id.* at 12:17–37.

E. The Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–19 of the '499 patent based on the following asserted grounds:

Reference(s)	Basis	Claims Challenged
Oh[2]	§ 102	1–5, 8–11, 14–16, 19
Oh, Cannon[3]	§ 103	1–5, 8–11, 14–16, 19

[2] Oh et al., US 7,286,507 B1, iss. Oct 23, 2007 (Ex. 1003).
[3] Cannon et al., US 2010/0177760 A1, pub. July 15, 2010 (Ex. 1004).

Reference(s)	Basis	Claims Challenged
Oh , Fischer[4]	§ 103	5–8, 12, 13, 17, 18

Petitioner also relies on the declaration of James A. Proctor, Jr, Ex. 1017.

F. Illustrative Claim

Claims 1, 8, and 14 of the challenged claims of the '499 patent are independent. Claim 1 illustrates the claimed subject matter:

> 1. A system for transporting wireless communications, comprising:
>
> a baseband unit;
>
> a plurality of signal sources, including at least a first signal source and a second signal source;
>
> a plurality of remote units, including at least a first remote unit and a second remote unit;
>
> wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;
>
> wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;
>
> wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;
>
> wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;

[4] Fischer, US 2007/0008939 A1, pub. Jan. 11, 2007 (Ex. 1005).

wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and

wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.

Ex. 1001, 14:2–29.

II. ANALYSIS

A. Person of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art "would have at least: (1) a bachelor's degree in electrical engineering; and (2) a minimum of 3-4 years of industry experience in wireless communications networks and engineering," and that "an individual with an advanced degree in electrical engineering would require less industry experience (e.g., 1-2 years)." Pet. 7; Ex. 1017 ¶ 42. Patent Owner argues that "the above POSITA at the time of the '499 patent would also have industry experience dealing with wireless devices such as remote units and antennas." Prelim. Resp. 14. Other than specifying the type of industry experience required for one of ordinary skill in the art, Patent Owner does not appear to disagree with applying Petitioner's proposed level of skill. *See id.* We adopt Petitioner's provided definition for the level of skill of a person of ordinary skill in the art as reasonable and consistent with the prior art.

B. Claim Construction

In an *inter partes* review, the Board construes each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Under the same standard applied by district courts, claim terms take their plain and ordinary meaning

as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner requests that we construe the claim terms "signal sources," "radio resources," and "baseband unit," each of which appear in each challenged independent claim. Pet. 8–11. Patent Owner addresses Petitioner's proposed constructions and additionally discusses the construction of "baseband unit . . . configured to send a digital representation of a first set of radio resources" and "baseband unit . . . configured to send a digital representation of a first set of radio resources," which appears in claim 1 and substantially similarly in claim 8. Prelim. Resp. 14–24.

1. "signal sources"

Because the '499 patent describes that the source of signals distributed by the described antenna system are base transceiver stations that transmit RF communications, Petitioner argues that the construction for "signal source" is "an RF transceiver or transmitter." Pet. 8 (citing Ex. 1001, 4:63–65; Ex. 1017 ¶¶ 48, 50). Patent Owner argues that '499 patent describes the antenna system as designed and configured to work with operator networks. Prelim. Resp. 14–15 (citing Ex. 1001, 1:33–43). Patent Owner argues that "[a] POSITA would review the '499 patent and understand that the inventions are directed to allocating radio resources inside the DAS and do

not impose specific limitations on components outside the DAS." *Id.* at 16. Therefore, Patent Owner contends we should construe "signal sources" as "an operator's network."

We determine that "signal sources" does not require express construction to address the asserted grounds of unpatentability in this proceeding. *Vivid Techs., Inc. v. American Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.").

2. "radio resources"

The claims require that "a plurality of radio resources" be received from a first signal source. *See, e.g.*, Ex. 1001, 14:12–14. Petitioner and Patent Owner each cite the '499 patent's exemplary description of radio resources as including "RF carriers, CDMA codes or TDMA time slots." Pet. 9 (citing Ex. 1001, 12:61–62); Prelim. Resp. 17 (citing Ex. 1001, 12:5–9).

Petitioner contends that the proper construction of "radio resource" is "an analog component of an RF spectrum." Pet. 8–9. Petitioner cites Mr. Proctor's declaration evidence and a reference book to argue that "radio resources" "consist of an 'RF spectrum'" and that carriers and CDMA codes are components of the RF spectrum. *Id.* at 9 (citing Ex. 1017 ¶¶ 56–71; Ex. 1012, 7, 12–15, 26, 28, 30–34, 108–109, 278, 297, FIGS 2.3, 2.4, 2.7, 2.13, 2.17, 2.19, 4.15). Petitioner argues that because the claim concerns both "radio resources" and "digital representations of 'radio resources'," "the structure of the claims make clear that radio resources are analog, not digital." *Id.* at 9.

Patent Owner, citing the examples provided in the '499 patent, argues that "radio resources" should be construed to mean "wireless resources such as RF carriers, CDMA codes, or TDMA time slots." Prelim. Resp. 16–18 (citing Ex. 1001, 2:5–9). Patent Owner argues that "[t]he '499 patent further explains that radio resources refer to the frequency, coding, or time slot a remote unit should use to send user communications (e.g., voice or data) [via its antenna]." *Id.* at 17 (citing Ex. 1001, 12:5–9). Patent Owner further argues that, as radio resources should include CDMA codes or TDMA time slots, Petitioner's construction is over-broad. *Id.* at 18.

Petitioner does not clearly explain why its assertions that radio resources consist of an RF spectrum and that these radio resources can be sent in a digital representation lead to the conclusion that "radio resources" should be construed to mean "an analog component of an RF spectrum." We do not see how the equivalence of "radio resources" to an analog *component* of an RF spectrum follows from the indication in the claims that the baseband unit sends a digital representation of radio resources. To the extent that Petitioner intends its construction of "radio resources" to encompass the data being transmitted via RF, we disagree that is a proper construction of the term. The '499 patent gives as examples of "radio resources" RF carriers, CDMA codes, and TDMA time slots. *See* Ex. 1001, 12:5–37. No indication is given that the data carried wirelessly using these over the interface to the DAU is, itself, a radio resource. Rather, the '499 patent describes deploying "radio resources" "for *use* by a particular DRU which need[s] those radio resources within its coverage area," or modifying system configuration to "remove" "radio resources" "for *use* by a particular DRU." *Id.* at 12:58–13:2 (emphasis added).

Thus, we agree with Patent Owner that the '499 patent's exemplary explanation that radio resources may be "RF carriers, CDMA codes or TDMA time slots" appears more useful in determining how to construe "radio resources." Prelim. Resp. 17; Ex. 1001, 12:6–8, 12:61–62, 12:66–13:1. The '499 patent describes that digital-up converters within the DRUs allow the radio resources, such as "any specific narrow frequency band or bands, RF carriers, or RF channels" or "any specific time slot or time slots of [a] carrier," to "appear at the output of a given DRU." *Id.* at 7:3–37, 10:11–27. The '499 patent further describes, in an exemplary embodiment where various carriers are distributed to DRUs, that carriers are present at the antenna port of the DRU. *Id.* at 6:21–24, 6:34–38, 6:55–58, 12:29–36. The '499 describes an embodiment in which "where a wideband CDMA signal is present within . . . the bandwidth corresponding to a first carrier a the input port to [a] DAU . . . the transmitted signal at the antenna ports of [certain DRUs] will be a wideband CDMA signal which is virtually identical to the signal present within the bandwidth corresponding to that first carrier at the input port to [the] DAU." *Id.* at 10:2–10. These portions of the '499 patent confirm that the claim term "radio resources," in the context of the patent disclosure, would not properly be used to refer only to the data transmitted via RF, but refers to information defining or describing the way that data is being transmitted. In context, the related claim term "digital representations of radio resources" encompasses information about radio carriers, bands, codes, or other similar information for use in "transmission at the antenna" of a remote unit.

We do not provide a specific construction for "radio resources." Instead, for the reasons discussed above, we determine that the plain and

ordinary meaning of "radio resources" as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure: (1) includes RF carriers, CDMA codes, and TDMA time slots; and (2) excludes data that does not incorporate information used in the transmission of the radio resource from an antenna of the remote unit.

3. "baseband unit"

Petitioner argues that the scope of the term "baseband unit," found in each independent challenged claim, should be construed to include "a device that performs conversion to and from baseband signals, *e.g.*, digitized streams." Pet. 10–11 (citing Ex. 1001, 4:66–5:6; Ex. 1017 ¶ 76). Petitioner cites disclosures of two other DAS references to support this conclusion. *Id.* (citing Ex. 1007 ¶ 6; Ex. 1004 ¶ 21; Ex. 1017 ¶¶ 77–87).

Patent Owner argues that "baseband unit" should be construed as "a unit that manages baseband communications between an operator network and one or more digital remote units." Prelim. Resp. 19–20.

We determine that "baseband unit" does not require express construction to address the asserted grounds of unpatentability in this proceeding. *Vivid Techs.*, 200 F.3d at 803.

4. "baseband unit . . . configured to send a digital representation of a [first/second] set of radio resources"

Petitioner does not address the claim terms "baseband unit . . . configured to send a digital representation of a [first/second] set of radio resources," but Patent Owner argues that we should construe this term because it is in contention in the related district court proceeding. Prelim. Resp. 22. However, we determine that these terms do not require express

construction to address the asserted grounds of unpatentability in this proceeding. *Vivid Techs.*, 200 F.3d at 803.

C. Principles of Law

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Although the elements must be arranged or combined in the same way as in the claim, "the reference need not satisfy an *ipsissimis verbis* test," i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *accord In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990).

A claim is unpatentable under 35 U.S.C. § 103 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. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

"In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed.

Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring [*inter partes*] review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner must explain with particularity how the prior art would have rendered the challenged claims unpatentable. 35 U.S.C.A. § 312(a)(3); 37 C.F.R. § 42.104 ("The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.").

D. Asserted Anticipation Based on Oh

Petitioner asserts Oh anticipates claims 1–5, 8–11, 14–16 and 19. Pet. 19–53. Patent Owner addresses these assertions in the Preliminary Response. Prelim. Resp. 31–44.

1. Overview of Oh

Oh is titled "Method and System for Dynamically Routing between a Radio Access Network and Distributed Antenna System Remote Antenna Units" and describes a DAS system that includes mapping data that correlates network coverage segments (such as cell sectors) with addresses for the remote antenna units, to distribute coverage as desired throughout the DAS. Ex. 1003, codes (54), (57). Oh includes a block diagram of a communications system in its Figure 1, reproduced below.

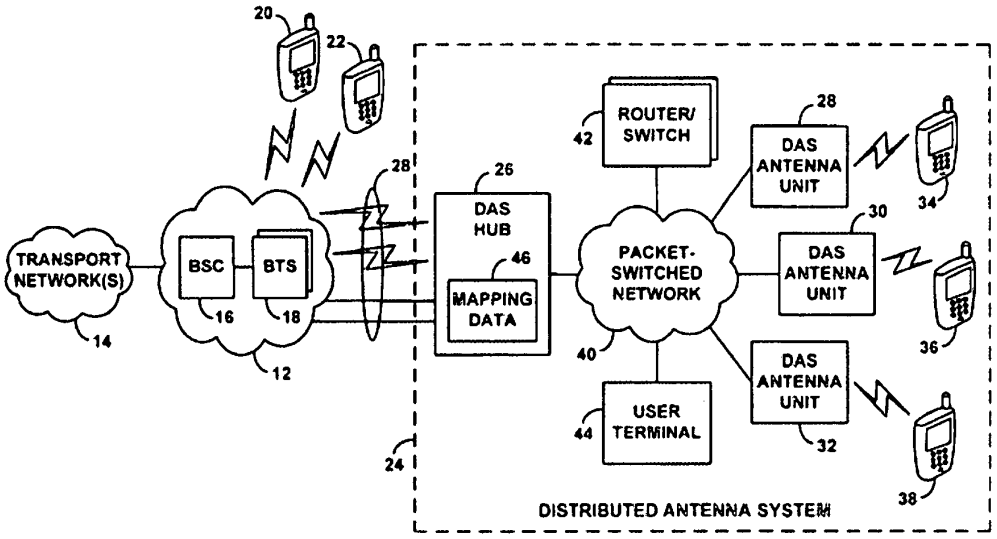


FIG. 1

Figure 1 of Oh illustrates DAS 24 that communicates with radio access network (RAN) 12, which is in RF communication with wireless devices 20 and 22. *Id.* at 4:33–46. RAN 12 defines coverage segments; each coverage segment may be a cell, cell sector, or other coverage area of RAN 12, or a particular carrier frequency or spreading code. *Id.* at 4:47–64. Each coverage segment "constitutes a mechanism in or through which the RAN communicates with client devices that it serves." *Id.* at 4:47–50.

DAS 24 extends coverage of RAN 12. *Id.* at 4:65–5:1. DAS hub 26 in DAS 24 may be connected to RAN 12 and receive signals from BTSs 18 via, e.g., an antenna structure receiving signals from RAN 12, or directly via a fiber-optic cable. *Id.* at 4:40–46, 5:1–56. DAS hub 26 stores mapping data 46, which correlates RAN coverage segments of RAN 12 with addresses of DAS antenna units 28, 30, 32. *Id.* at 7:35–47. DAS hub 26 uses the mapping data 46 to determine one or more antenna unit addresses to

which it should route incoming (downlink) traffic from RAN 12 to DAS antenna units, and which coverage segments to transmit outgoing data from DAS antenna units to RAN 12. *Id.* at 7:42–53, 9:3–11, Fig. 2. DAS hub 26 and the DAS antenna units communicate via packet-switched network 40. *Id.* at 6:6–22.

2. Analysis of Asserted Anticipation by Oh

We have reviewed the parties' assertions and supporting evidence. For the reasons discussed below, Petitioner does not demonstrate a reasonable likelihood of prevailing in its challenge to claims 1–5, 8–11, 14–16 and 19 on the basis of anticipation by Oh.

a. *Independent Claim 1*

Petitioner relies on Oh's DAS 24 as disclosing the system of claim 1. Pet. 19–41. Petitioner argues that Oh's DAS hub 26 discloses the baseband unit, that the transceivers of BTSs 18 disclose the first and second signal sources, and that the physical layer connections 28 of hub 26 disclose the plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources. *Id.* at 22–26 (citing Ex. 1003 2:8, 4:40–46, 8:1–31, Fig. 1; Ex. 1017 ¶¶ 128, 129, 136, 137), 28–31 (citing Ex. 1003 5:3–10; Ex. 1017 ¶ 146). Petitioner further argues that Oh's DAS antenna units 30 and 32 disclose the first remote unit and second remote unit of claim 1. *Id.* at 27–28 (citing Ex. 1003 5:57–6:5, Fig. 1; Ex. 1017 ¶¶ 140–142).

With respect to the radio resources, Petitioner argues that these are disclosed by Oh's radio access (RAN) coverage segments, which can take the form of a cell, cell sector, or CDMA sector. *Id.* at 31–33 (citing Ex. 1003 2:64–3:16; 4:47–56; 4:47–63, 9:3–11, Fig. 1; Ex. 1017 ¶¶ 150–155).

Petitioner argues that the claim term "wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit" is disclosed by the description of Oh's DAS. Pet. 33–37. Oh's DAS, according to Petitioner, digitizes incoming traffic from the BTSs 18, packetizes that traffic, and sends the IP packets to the corresponding DAS antenna unit. *Id.* at 34–35 (citing Ex. 1003 2:3–8, 8:6–10, Fig. 1; Ex. 1017 ¶ 158). Petitioner contends that "Oh explains that the digital representations of the radio resources are then converted to analog RF and transmitted by the remote DAS antenna unit: '[u]pon receipt of those IP packets at the DAS antenna units having the destination IP addresses, each recipient DAS antenna unit may then depacketize the digitized bit stream, convert the bit stream to an RF signal, and emit the RF signal via its antenna for receipt by any wireless client devices operating in its local coverage area.'" *Id.* at 35 (quoting Ex. 1003 8:10–16, citing Ex. 1007 ¶ 159).

Patent Owner disputes that Oh discloses that digital representations of radio resources are sent to a DAS antenna unit. Prelim. Resp. 35–37. Patent Owner argues that "Oh's DAS antenna units are pass-through devices with static configurations as they merely relay whatever traffic is sent to them according to the mapping or routing table. Oh simply does not disclose sending configuration information or 'digital representations' of a set of radio resources to the antenna units that indicates which sets of 'radio resources' to use." Prelim. Resp. 37 (emphasis omitted). Patent Owner

further contends that "Petitioner appears to confuse RF traffic in Oh with radio resources." *Id.* (emphasis omitted). We agree in material part.

Oh describes the DAS hub "receiving *incoming communication traffic* (signaling and/or bearer data) *in* a source RAN coverage segment" and "forwarding *the incoming communication traffic* via the packet-switched network." Ex. 1003, 3:6–15 (emphasis added). While Petitioner argues that Oh's RAN coverage segments are the radio resource, and while communications between the DAS antenna units and user equipment is described as RF communication, there is no indication in Oh that the DAS antenna units transmit the radio resource (RAN coverage segment), a digital representation of which was received at the DAS hub. *See* Ex. 1003, 8:1–16 (describing converting and transmitting "incoming traffic").

In accordance with our claim construction of "radio resources," *supra* Section II.B.2, Oh's transmission of communication traffic to the DAS antenna units, which does not incorporate information used in the transmission of the radio resource from an antenna of the remote unit, does not disclose the sending of a digital representation of radio resources. Petitioner does not show how Oh discloses "radio resources" being received by the DAS hub from the BTSs (first and second signal sources) and sent (in a digital representation) so those radio resources can be transmitted at the antenna of that unit. Rather, on the present record, we determine that Oh discloses only underlying data that arrived in the radio resource as included in the "incoming communication traffic" which is sent to the Oh DAS antenna units. Therefore, we determine that Petitioner has not demonstrated

a reasonable likelihood that it would prevail in showing claim 1 anticipated by Oh.

b. *Independent claims 8 and 14*

Petitioner's arguments with respect to claims 8 and 14 as anticipated by Oh, with respect to the "radio resources" discussed in those claims, refer to Petitioner's arguments relating to claim 1, and therefore suffer from the same defect. Pet. 48–49, 51–52. We thus determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing claims 8 and 14 are anticipated by Oh.

c. *Claims 2–5, 9–11, 15, 16 and 19*

Petitioner's arguments with respect to claims 2–5, 9–11, 15, 16 and 19 as anticipated by Oh, depend on the arguments relating to the independent claims from which they depend, and therefore suffer from the defect discussed above. Pet. 41–46, 49–50, 52–53. We thus determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing claims 2–5, 9–11, 15, 16 and 19 anticipated by Oh.

E. Analysis of Asserted Obviousness over Oh and Cannon

Petitioner asserts claims 1–5, 8–11, 14–16 and 19 would have been obvious over Oh and Cannon. Pet. 19–53. Patent Owner addresses these assertions in the Preliminary Response. Prelim. Resp. 31–44.

1. Overview of Cannon

Cannon is titled "Systems and Methods for Improved Digital RF Transport in Distributed Antenna Systems" and describes a DAS system in which RF signals from a base station are transmitted to remote units, which reconstruct the RF signals from the signal and cause the reconstructed RF signals to be transmitted from an antenna. Ex. 1004 codes (54), (57), ¶ 20.

Cannon includes a block diagram of its DAS system in its Figure 1, reproduced below.

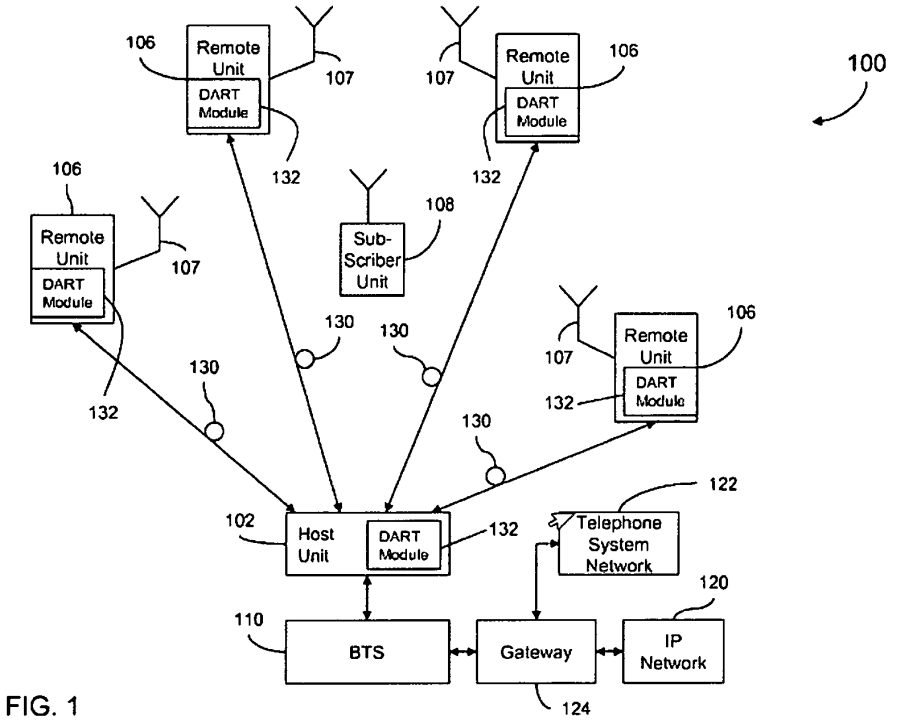


FIG. 1

Figure 1 depicts DAS 100, including host unit 102 and remote units 106. *Id.* ¶ 18. Host unit 102 is coupled to at least one base transceiver station (BTS) 110. *Id.* ¶ 19. Host unit 102 receives downlink signals from BTS 110 and generates transport signals for transmitting to one or more remote unit 106. *Id.* ¶ 20. "[T]he downlink and uplink transport signals transmitted between host unit 102 and remote units 106 over communication links 130 are generated by digitizing the downlink and uplink RF signals, respectively." *Id.* ¶ 21. "In other words, the downlink and uplink transport signals are not analog RF signals but instead are digital data signals representing digital RF samples of a modulated RF signal." *Id.* Thus, for example, if a

communication is received as a modulated RF signal in the 900 MHz band, the host unit generates baseband digital samples of that modulated 900 MHz RF signal, which are sent to the remote unit, where they are converted from the digital version to an analog RF signal to be wirelessly radiated from the remote unit's antenna. *Id.* A digital to analog radio frequency transceiver (DART) module performs this conversion. *Id.* at ¶¶ 22–25.

DART modules in remote units are specific for a particular frequency band, but may be reprogrammed to meet the changing needs of the end user. *Id.* at ¶¶ 25, 46.

2. Analysis of Asserted Obviousness Over Oh and Cannon

We have reviewed the parties' assertions and supporting evidence. For the reasons discussed below, Petitioner does not demonstrate a reasonable likelihood of prevailing in its challenge to claims 1–5, 8–11, 14–16 and 19 on the basis of obviousness over Oh and Cannon.

a. *Claim 1*

To show obviousness of claim 1 over Oh and Cannon, Petitioner relies generally on Oh, but combines it with Cannon's "translation from analog radio resources" to a "digital representation of an RF, IF, or baseband version of the original RF signal." Pet. 16–17 (citing Ex. 1004 ¶ 21, Fig. 3; Ex. 1017 ¶ 105). Petitioner argues that the DART module of Cannon would provide a "digital baseband" output to Cannon's remote radio units, which would comprise a digital representation of the original RF signal. *Id.* at 53–54 (citing Ex. 1017 ¶ 218); Ex. 1017 ¶¶ 220–221.

Petitioner argues that

> [a person of ordinary skill in the art] would be motivated to substitute Oh's digital-to-analog software with Cannon's because it is a simple substitution of one software module with

> another software module, in order to gain any benefits in various protocols (e.g., CPRI, etc.) or efficiency that Cannon's DART module offered beyond Oh's. (EX1017 ¶ 218.) Incorporating Cannon's DART module into Oh's system would also beneficially allow separate systems from Oh and Cannon to interoperate so that Oh's baseband unit would send signals to Cannon's remote units and vice versa. (EX1017 ¶ 218.)

Pet. 54.

Patent Owner argues that the motivation to combine provided by Petitioner is insufficient to meet the Petitioner's burden with respect to obviousness. Prelim. Resp. 46–48.

We recognize that "[t]o satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). The asserted motivation "to gain any benefits in various protocols . . . or efficiency" that Cannon's DART module might provide, without more, seems so nebulous as to be generic. *See ActiveVideo Networks, Inc. v. Verizon Comms., Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012). The tautologous motivation to combine elements from Cannon with the Oh system so that a system combining Oh and Cannon would interoperate is similarly unavailing. Further, we are unpersuaded that the combination is a simple substitution. We also note that there is no discussion of a reasonable expectation of success. *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (holding that an obviousness determination requires finding "both 'that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" (citation omitted)).

Thus, we agree with Patent Owner that Petitioner has not adduced a motivation to combine Oh and Cannon. For this reason, Petitioner does not demonstrate a reasonable likelihood of prevailing in its challenge to claim 1 on the basis of obviousness over Oh and Cannon.

Petitioner's arguments for the obviousness of claims 8 and 14 over Oh and Cannon rely on the same or substantially the same arguments as presented for claim 1. Pet. 61–63, 64–65. Thus, for the same reason, Petitioner does not demonstrate a reasonable likelihood of prevailing in its challenge to claims 8 and 14 on the basis of obviousness over Oh and Cannon.

b. *Claim 5*

Petitioner's argument that claim 5 would have been obvious over Oh and Cannon relies on its arguments with respect to the obviousness of claim 1over Oh and Cannon. Pet. 59. Petitioner presents an additional argument that two elements of Oh could be co-located. *Id.* at 59–60 (citing Ex. 1004 ¶ 2; Ex. 1017 ¶ 235). This argument provides a separate motivation for the combination of the arrangement in Cannon with the elements of Oh. *Id.* at 60–61 (citing Ex. 1017 ¶ 239). We note that this motivation to combine is similarly deficient, as it argues only that the combination "would perform the same functions as they did separately, with the only difference being the geographical placement of the components." *Id.*

The argument with respect to claim 5 suffers from the same deficits discussed above with respect to claim 1, to the extent it relies on the argument of obviousness over Oh and Cannon. In addition, Petitioner's reasoning for the combination for the additional limitation of claim 5 is similarly deficient, as it does not provide a motivation to combine. *See*

Belden Inc. v. Berk-Tek LLC, 805 F.3d 1064, 1073 (Fed. Cir. 2015) ("obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention").

c. *Claims 2–4, 9–11, 15, 16, and 19*

Petitioner's arguments for claims 2–4, 9–11, 15, 16, and 19 rely on the arguments for obviousness over Oh and Cannon of the independent claims from which they depend, and therefore suffer from the defect discussed above. Pet. 58–59, 63–64, 65–66. We thus determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing claims 2–4, 9–11, 15, 16, and 19 would have been obvious over Oh and Cannon.

F. Asserted Obviousness Based on Oh and Fischer

Petitioner asserts claims 5–8, 12, 13, 17, and 18 would have been obvious over a combination of Oh and Fischer. Pet. 66–76.

Petitioner's assertions with respect to claims 5–7, 12, 13, 17, and 18 are based on arguments relating to the disclosures or teachings of Oh with respect to their independent base claims. Pet. 66–70, 72–76. For the reasons discussed above, these arguments do not demonstrate a reasonable likelihood that Petitioner will prevail in showing claims 5–7, 12, 13, 17, and 18 would have been obvious over Oh and Fischer.

With respect to claim 8, Petitioner relies for each element of the claim, other than the preamble, on the anticipation argument made with respect to claim 8. *Id.* at 70–72. For the reasons discussed above with respect to that argument, Petitioner does not demonstrate a reasonable likelihood that Petitioner will prevail in showing claim 8 would have been obvious over Oh and Fischer.

G. 35 U.S.C. § 325(d) Discretion

Patent Owner asserts that we should exercise our discretion to decline institution under § 325(d) because the Petition relies on Oh and Cannon, which were each submitted in an information disclosure statement during prosecution of the application that issued as the '499 patent, and because during that prosecution a reference was considered that incorporated Fischer. Prelim. Resp. 2–3, 25–30; Sur-Reply. Because we deny institution for the reasons explained above, Patent Owner's request to deny institution under § 325(d) is moot.

III. CONCLUSION

For the foregoing reasons, we do not institute an *inter partes* review.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied as to the challenged claims of the '499 patent; and

FURTHER ORDERED that no *inter partes* review is instituted.

IPR2020-01430
Patent 10,334,499 B2

PETITIONER:

Denis J. Sullivan
Naresh K. Kannan
Thomas Hoehner
BARCLAY DAMON TOWER
dsullivan@barclaydamon.com
nkannan@barclaydamon.com
thoehner@barclaydamon.com

PATENT OWNER:

S. H. Michael Kim
David D. Schumann
Cliff Win
Michael C. Saunders II
FOLIO LAW GROUP PLLC
michael.kim@foliolaw.com
david.schumann@foliolaw.com
mike.saunders@foliolaw.com

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
19-cv-2367-RGA	12/30/2019	For The District Of Delaware

PLAINTIFF	DEFENDANT
DALI WIRELESS, INC. a Delaware corporation	JOHN MEZZALINGUA ASSOCIATES, LLC d/b/a JMA Wireless, a Delaware limited liability company

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	US 10,334,499 B2	6/25/2019	Dali Wireless, Inc.
2	US 9,820,171 B2	11/14/2017	Dali Wireless, Inc.
3			
4			
5			

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
See attached Order

CLERK	(BY) DEPUTY CLERK	DATE
John A. Cerino	J. Salvoza	11/8/2021

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Application Number	16/059,434
Filing Date	August 9, 2018
First Named Inventor	Shawn Patrick Stapleton
Title	DISTRIBUTED ANTENNA SYSTEM
Art Unit	2473
Examiner Name	ZHAO, WEI
Attorney Docket Number	DALI0004USC5

SIGNATURE of Applicant or Patent Practitioner

Signature	/Sarah Mirza/	Date (Optional)	December 22, 2021
Name	Sarah Mirza	Registration Number	74,866
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.

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

DALI WIRELESS, INC.

☐ 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)

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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	Albert Lee	Date (Optional)	
Name	Albert Lee		
Title	CEO of DALI WIRELESS, INC.		

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

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International Application Number:	
Confirmation Number:	2049
Title of Invention:	DISTRIBUTED ANTENNA SYSTEM
First Named Inventor/Applicant Name:	Shawn Patrick Stapleton
Customer Number:	167137
Filer:	Sarah W. Mirza/Steve Johnson
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	10333-22-CON-5

CONFIRMATION NO. 2049

167137
SHERIDAN ROSS PC
1560 Broadway
Suite 1200
Denver, CO 80202

POWER OF ATTORNEY NOTICE

OC000000130720634

Date Mailed: 12/28/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/22/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

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

/ytdemisse/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/059,434	08/09/2018	Shawn Patrick Stapleton	DALI0004USC5

CONFIRMATION NO. 2049

107456
Artegis Law Group, LLP
John Carey
7710 Cherry Park Drive Suite T #104
Houston, TX 77095

POA ACCEPTANCE LETTER

OC000000130720670

Date Mailed: 12/28/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/22/2021.

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

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

/ytdemisse/

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
16/059,434	08/09/2018	Shawn Patrick Stapleton	DALI0004USC5	155127

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 12/28/2021 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

X Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Sarah Mirza/
Name:	Sarah Mirza
Registration Number:	74866

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

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.	DATE FILED	U.S. DISTRICT COURT
2:22-cv-12	1/7/2022	Eastern District of Texas

PLAINTIFF	DEFENDANT
DALI WIRELESS, INC.	AT&T CORP., et al

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,682,338	3/25/2014	Dali Wireless, Inc.
2	9,197,358	11/24/2015	Dali Wireless, Inc.
3	11,026,232	6/1/2021	Dali Wireless, Inc.
4	10,334,499	6/25/2019	Dali Wireless, Inc.
5			

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

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

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

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 for the Western District of Texas on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-104	1/27/2022	for the Western District of Texas

PLAINTIFF	DEFENDANT
Dali Wireless, Inc.	Cellco Partnership d/b/a Verizon Wireless, et al.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	11,026,232	6/1/2021	Dali Wireless, Inc.
2	10,334,499	6/25/2019	Dali Wireless, Inc.
3	11,006,343	5/11/2021	Dali Wireless, Inc.
4	8,682,338	3/25/2014	Dali Wireless, Inc.
5			

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		
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4		
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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