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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
62/480,031	03/31/2017		130	MINIX 17-1-1		

23531
SUITER SWANTZ PC LLO
14301 FNB PARKWAY
SUITE 220
OMAHA, NE 68154

CONFIRMATION NO. 8174
FILING RECEIPT



0000000090619278

Date Mailed: 04/14/2017

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. 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)

Paul Beard, Bigfork, MT;

Applicant(s)

uAvionix Corporation, Omaha, NE;

Power of Attorney:

Sean Suiter--34260

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

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

If Required, Foreign Filing License Granted: 04/13/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 62/480,031**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Remote Identification

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

page 1 of 3

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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

NOT GRANTED

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

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.

Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name

Middle Name

Family Name

City

State

Country ;

Paul

Beard

Bigfork

MT

US

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

Add

Title of Invention

Remote Identification

Attorney Docket Number (if applicable)

MINIX 17-1-1

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number

☐ Firm or Individual Name

Customer Number

23531

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:

Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Entity Status

Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29

- ☒ Applicant asserts small entity status under 37 CFR 1.27
- ☐ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ☐ No

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 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.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/sean patrick suiter/			Date (YYYY-MM-DD)	2017-03-31
First Name	Sean Patrick	Last Name	Suiter	Registration Number (If appropriate)	34260

This collection of information is required by 37 CFR 1.51. 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 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

Privacy Act Statement

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

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

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

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

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Paul		Beard			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	Bigfork	State/Province	MT	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	300 Pine Needle Lane					
Address 2						
City	Bigfork	State/Province	MT			
Postal Code	59911	Country	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						

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	23531		
Email Address	file@suiter.com	Add Email	Remove Email

Application Information:

Title of the Invention	Remote Identification		
Attorney Docket Number	MINIX 17-1-1	Small Entity Status Claimed	☒
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	23531		

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		Remove
Application Number	Continuity Type	Prior Application Number

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		

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).

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.

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		

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).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☒ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☒ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		

Applicant Information:

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

Applicant	1	Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear		
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor:		
If the Applicant is an Organization check here. ☒		
Organization Name	Avionix Corporation	
Mailing Address Information For Applicant:		
Address 1	11248 John Galt Boulevard	
Address 2		
City	Omaha	State/Province NE
Country	US	Postal Code 68137
Phone Number		Fax Number
Email Address		
Additional Applicant Data may be generated within this form by selecting the Add button. Add		

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		

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

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/sean patrick suiter/		Date (YYYY-MM-DD)	2017-03-31
First Name	Sean Patrick	Last Name	Suiter	Registration Number
				34260
Additional Signature may be generated within this form by selecting the Add button.				Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MINIX 17-1-1
		Application Number	
Title of Invention	Remote Identification		

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

Privacy Act Statement

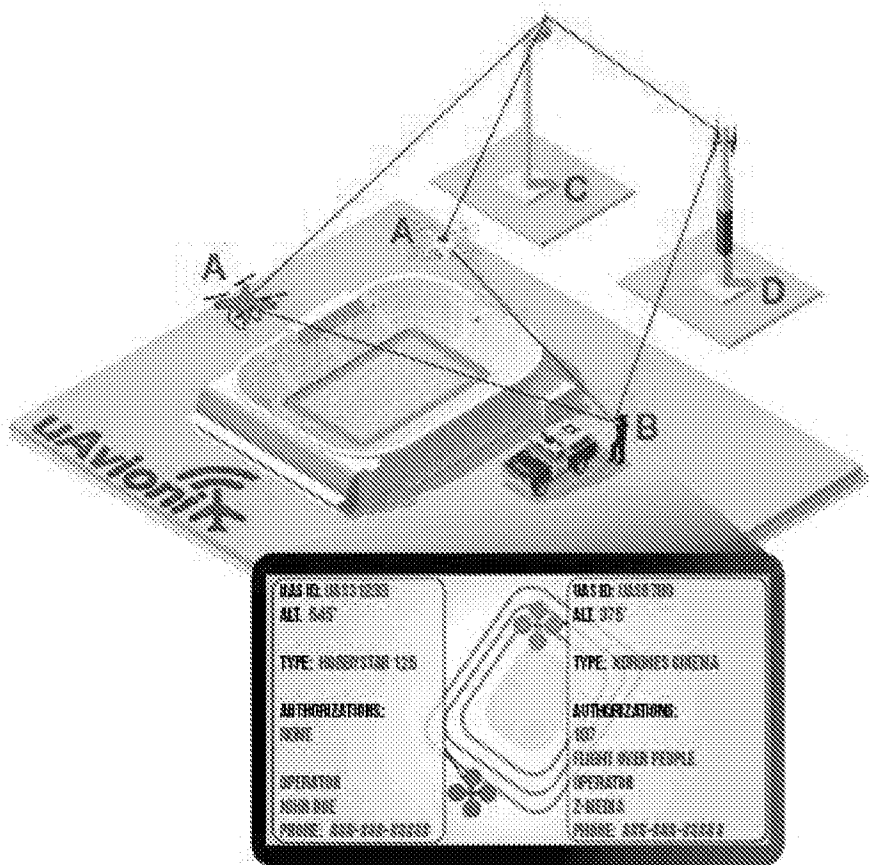
The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection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

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

Remote Identification

[REDACTED]



[REDACTED]

[REDACTED]

Founded with the specific intent of providing small size, weight, and power consumption (SWaP) components for sUAS communications, navigation, and surveillance (CNS) – uAvionix is the leading avionics solution provider for sUAS. With a product line consisting of Technical Standard Order (TSO) certified GPS receivers, ADS-B receivers and transceivers, and Mode A/C/S transponders, uAvionix has developed custom application specific integrated circuit (ASIC) solutions which range from 1 gram to 70 grams with transmit power outputs ranging from 0.01W to 200W.

All solutions provided within this paper leverage existing ASIC and hardware components within the uAvionix product line – resulting in Technology Readiness Levels (TRL) at the high end of the scale (6-9).

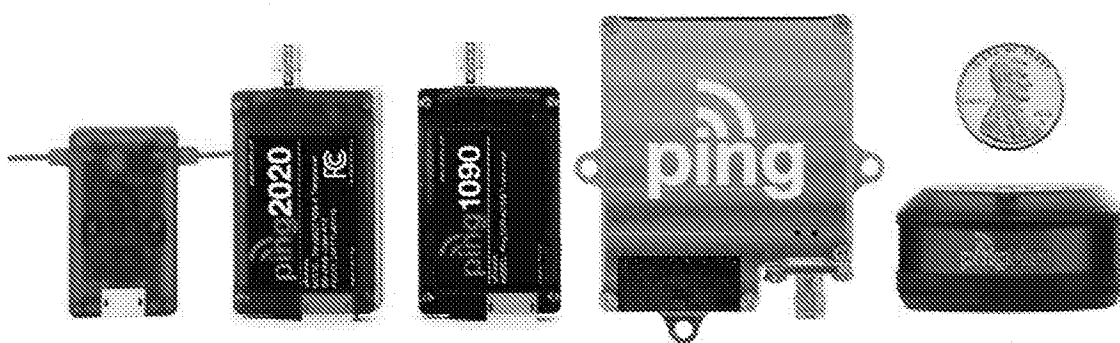


Figure 1: uAvionix solutions range from 1 to 70 grams

3 Assumptions

uAvionix has made the following assumptions regarding the requirements for a RID solution.

1. The primary purpose of the RID solution is for law enforcement or security personnel to remotely identify the sUAS aircraft and operator through a number of key parameters to be transmitted from an RID transmitter onboard the sUAS and received by receivers which may be handheld, permanently mounted, onboard other aircraft, or anywhere within range of the RID transmitter.
2. Other functions beyond the primary purpose stated may serve to increase the utility of the RID system, but benefits of additional functions must be weighed against additional cost or time to feasible widespread deployment. For example, an RID solution may aid in surveillance or Detect and Avoid (DAA) applications, but any such specific requirements may delay implementation of RID.
3. Data items transmitted from the sUAS RID would include at a minimum the FAA UAS registration number and sUAS position. This concept is not unlike a license plate on a vehicle or an N-Number on an aircraft which can be used by an eyewitness of a dangerous event to provide information to law enforcement for further investigation.
4. Considerations for spectrum congestion must be considered. With the potential for very high density sUAS traffic in the future, efficient use of spectrum is required to not adversely affect system performance. Means for mitigating spectrum use include, but are not limited to low-power transmissions, minimal transmission payload, transmission intervals, frequency modulation, and transmission only as a result of interrogation.
5. Size, Weight, and Power Consumption (SWaP) of any RID airborne devices should be consistent with sUAS platforms. The smallest aircraft should be targeted to support the maximum number of sUAS possible. This includes popular consumer models which are being used for professional purposes.
6. Considerations for anti-spoofing or source verification should be included.
7. The cost/price of RID devices should support regulatory mandates which would require compliant RID devices on significant quantity of sUAS – possible quantities for consideration include:
 - RID devices on all sUAS over 0.55lbs (consistent with Part 107 registration requirements)
 - RID devices on all sUAS registered to licensed Part 107 operators or organizations
8. Installation options should range from solutions which are an integrated part of the sUAS “out of the box” as delivered by the sUAS OEM to those that are purchased and installed as “add on” or “aftermarket” units.
9. The ground based component should offer a range of options which include receivers which are portable in nature, those which can be permanently installed, and those which work with and without LTE or internet coverage areas.

4 Technology Description

The overall solution is architected to work with or without internet connectivity and provide maximum flexibility and deployment options. At its core, the following components establish the basic functionality.

1. Airborne RID transmitter which broadcasts sUAS position and operator identifying data.
2. Ground based RID receivers. Options for pocket-sized mobile receivers for roaming security personnel as well as permanently fixed receivers for persistent monitoring.
3. Mobile app or apps which can operate in an internet denied or internet available environments to provide sUAS position and operator identifying information to viewer, as well as connectivity to the FAA registration database, UTM service providers, and publicly trusted TLS/SSL certificate for anti-spoofing capabilities such as AirMap's Drone ID.

Figure 2 shows an overview of the uAvionix RID Operational Concept in an internet/LTE denied environment, while Figure 3 shows the RID Operational Concept in an environment with internet/LTE access.

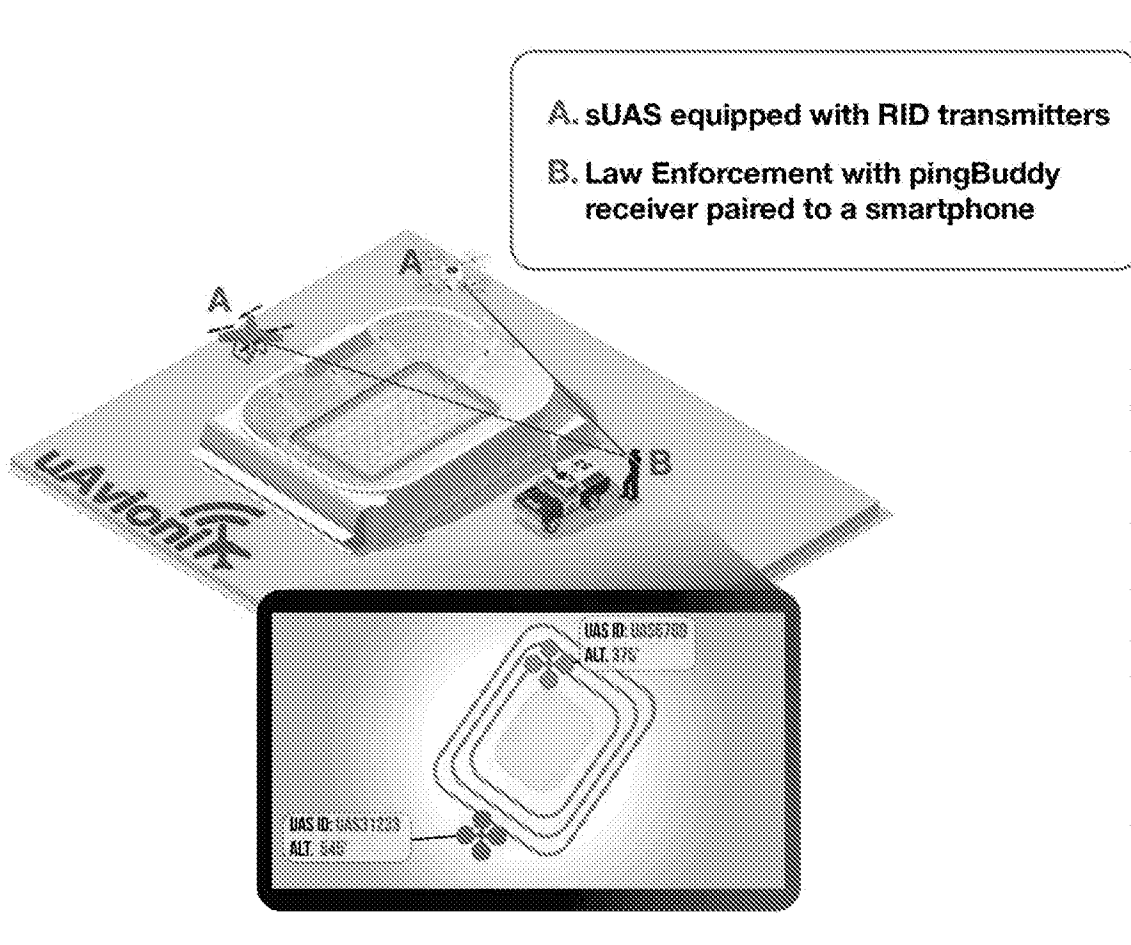


Figure 2: uAvionix Remote ID Operational Concept without Internet/LTE Connectivity

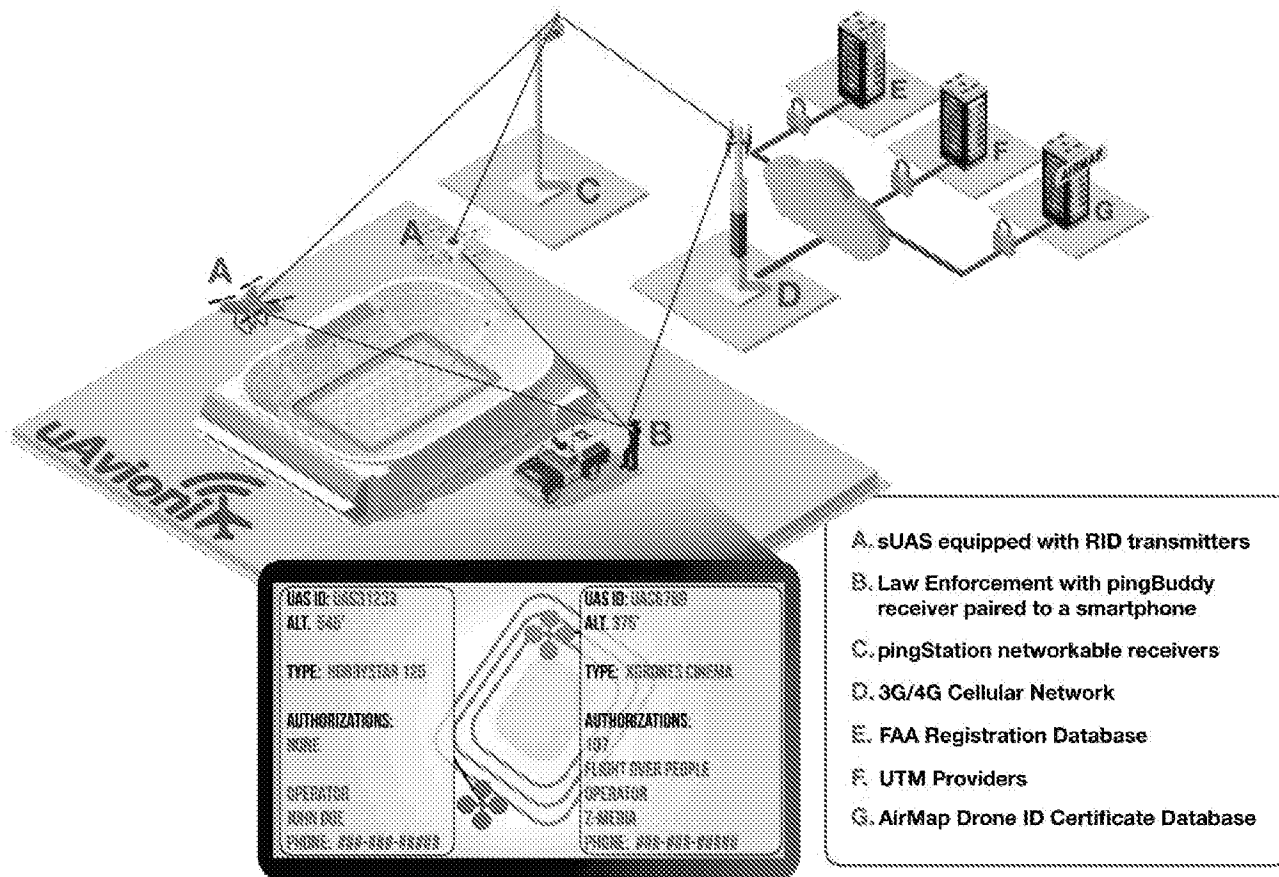


Figure 3: uAvionix Remote ID Operational Concept with Internet/LTE Connectivity.

The following description assumes the regulatory environment mandates RID equipment onboard the sUAS. Depending upon the extent of the mandate and upon the level of integration supported by the sUAS OEM, the RID transmitter may be integrated tightly into the sUAS aircraft, or carried as a separate “stick on” solution. Prior to the operation, the sUAS operator will configure the identifying information into the RID through the use of an app. Figure 5 is a screenshot of an existing configuration app for uAvionix products which connects via Wi-Fi hotspot to the device for parameter configuration. The fields in the app shown in the screenshot would be adapted to the appropriate fields for the RID device. The RID will transmit at a minimum the sUAS registration number and position data (latitude, longitude, altitude) of the sUAS and optionally a TLS/SSL AirMap Drone ID signature that can be used for source validation. uAvionix proposes transmitting minimal data at no greater than 1Hz at low power (discussed below) in order to enable efficient use of spectrum at scale. This basic data will allow visual correlation of the aircraft with the position on a map, optionally provide a digital signature for source validation, and provide either law enforcement or an uninvolved visual observer with the ability to report to law enforcement basic information which may be used to investigate an incident further.

Two different types of receivers are envisioned. A portable receiver would allow security personnel to receive the RID signal, and through a Wi-Fi hotspot within the receiver itself, would allow the user to observe the sUAS location on a map within an app with the identifying information. The mobile receiver

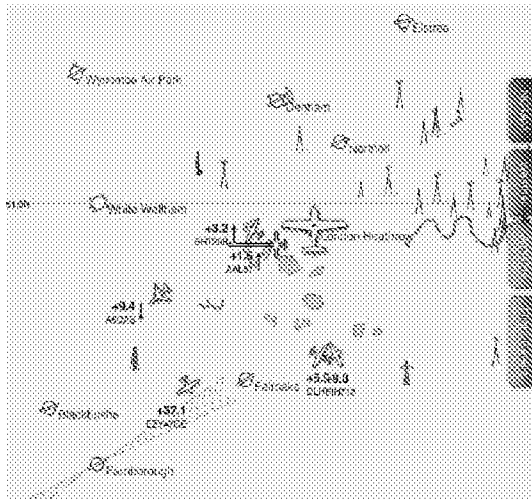


Figure 4: uAvionix receivers connect to a number of existing airspace awareness apps using a Wi-Fi hotspot connection and GDL90 protocol.

and app will work in an internet denied environment in this basic mode. If in an internet available environment, additional features in the app would provide more information such as registration and flight plan data through integration with the FAA registration database and/or UTM-like applications such as PrecisionHawk's LATAS or AirMap platforms. Figure 4 shows a sample air traffic mapping application using existing uAvionix products to display nearby air traffic. The app display would be customized for the RID functionality.

In addition to the portable receiver, a networkable fixed-base receiver would allow a permanent installation to provide RID coverage in desired areas, such as sports arenas or other populated areas – and populate any number of mapping or UTM like applications.

5 Technology Operational Concept

5.1 User Interface (UI) Applications

There are two different types of UI applications. Configuration apps, and RID display apps. The configuration app is used by the UAS Operator, and the RID display app is used by law enforcement or security personnel.

5.1.1 Configuration Application

The configuration application is produced by uAvionix and is used currently to program user specific configurations into uAvionix transmitting devices. Each device (including the proposed RID) includes a Wi-Fi hotspot capability. Upon connecting to the hotspot using an iOS or Android device, the user launches the "Ping" app which provides the capability to configure aircraft and pilot specific parameters as required. Upon entering the configuration data and selecting "Update" – the device is programmed with the configuration data which is stored in non-volatile memory for persistent storage.

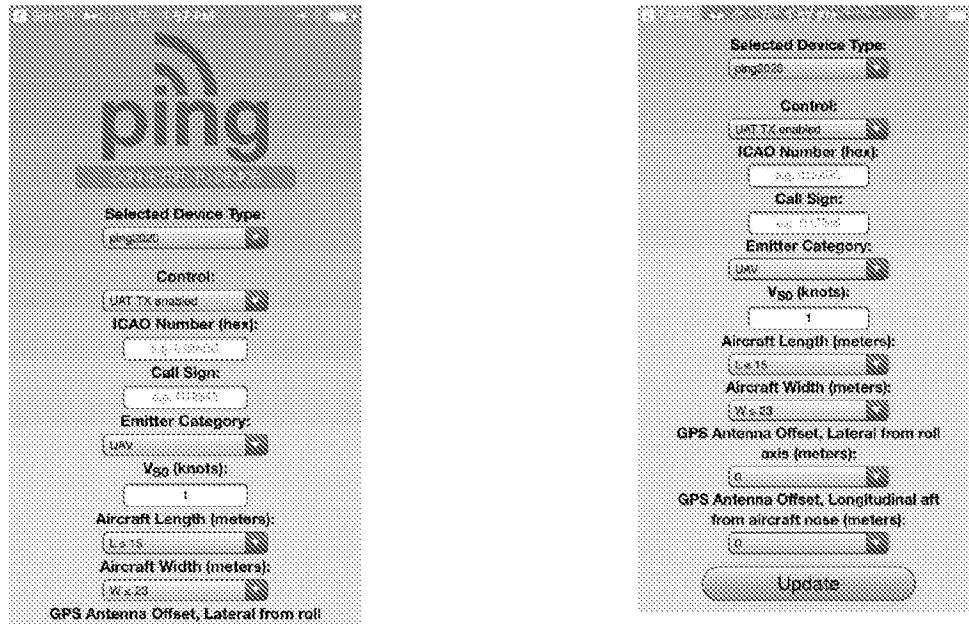


Figure 5: The Existing Ping Configuration App will be Modified to Include Remote ID Specific Parameters

5.1.2 RID Display Applications

The RID Display Application is used to observe and identify sUAS while in flight. The app has a “standalone” mode which can be used in an internet/LTE denied environment – and a “connected” mode which provides additional information if connected to additional receivers and databases through the internet.

5.1.2.1 Standalone Mode (Internet Denied)

When in standalone mode, only data received from the RID transmissions within range of the connected mobile app is available. This would include all parameters determined to be appropriate for the RID transmission, including at a minimum the FAA registration ID, digital signature, and position information of the sUAS. This data is used to plot the sUAS on a basic map, which is stored as a downloaded item onboard the iOS or Android device. When using a mobile receiver (see “pingBuddy” in Section 5.8), the user will connect to the Wi-Fi hotspot in the pingBuddy receiver to establish a data connection. The data will be transferred over Wi-Fi to the RID Display application, which will then display the sUAS location, altitude, and available threat information on a map display. Tapping the sUAS on the map will bring up any additional information available from the RID transmissions. Figure 6 illustrates the mobile receiver with a Wi-Fi connection to an iPad mini, displaying local air traffic. Basic validation can be accomplished in this environment. The application will



Figure 6: pingBuddy Mobile Receiver displaying traffic on an iOS Application



know if the transmissions came from the correct private key and the information was not spoofed. Upon connection to the internet at a later time, the app would check the Certificate Revocation List (CRL) to ensure the certificate was not on it and that the private key has not been compromised.

5.1.2.2 Connected Mode (Internet Available)

When in connected mode, additional information may be available to the user. This can include a direct connection to the FAA registration database for user lookup functions, or connections to Unmanned Traffic Management (UTM) systems for sUAS flight plan and aircraft data. The CRL can be accessed during real-time, and notify the user if the private key has been compromised or if the key was not on the CRL. If utilizing a permanent ground based network of receivers (see Section 5.8), connected mode will allow all sUAS tracked by the network of receivers to be displayed in the app.

5.2 Supporting Infrastructure

The uAvionix proposal includes the ability to operate in an environment with no supporting communications infrastructure – to include LTE or internet connectivity – by providing the ability to connect to a pocket-sized mobile receiver (pingBuddy). This provides maximum flexibility for security operations.

However, the solution also has the ability to take advantage of internet/LTE connectivity by providing additional capabilities and options beyond the basic identification provided by the mobile receiver. In addition to connectivity to FAA registration databases and UTM applications, the uAvionix solution also offers the ability to permanently install a network of RID receivers for permanent coverage of defined areas. If internet/LTE connectivity is available, the app provides the capability for the surveillance data provided by those networks.

5.3 Technology Readiness Levels (TRL)

The proposed solution offers a basic TRL 9 capability immediately, with decreasing levels of TRL as more complex options are integrated.

The proposed solution utilizes existing uAvionix hardware solutions which are fielded at TRL 9 to include both airborne and ground components. Software/firmware updates are required to shift communications into an ISM frequency band and configure the transmitted data “payload”. However, such software modifications are minor and the software/firmware is assessed to be at TRL 8.

The iOS and Android configuration application updates are currently in operational use at TRL 9 and would require only minor updates to include FAA registration and pilot information.

AirMap’s Drone ID is operational at TRL 9.

For technology/demonstration purposes – uAvionix will map the RID data into the existing GDL 90 protocol which is used by a large number of airspace traffic awareness applications. A purpose-built application is possible, but not necessary for technology demonstration purposes. Under this structure, any of the following iOS or Android apps in Figure 7 will be able to display RID targets:

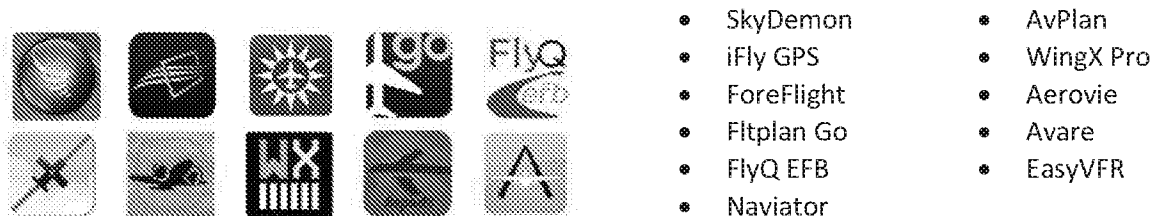


Figure 7: Compatible GDL 90 Applications

Integration of all high TRL components into a single application and hardware suite are at mid-levels of TRL (4-6).

uAvionix can have hardware and configuration software ready for operational testing/demonstration **within 30 days** from notification of desire to continue which would include the following:

- RID Hardware (transmitters and receivers)
- RID Configuration Application
- Usage of existing GDL 90 compliant display application

Additional functionality, including integration of AirMap Drone ID and White Space database integration (See Section 5.5.2) may take an additional 90 days.

In consultation with this response, Harris Corporation has offered a location which to integrate and test an RID network. A recently announced partnership between Harris and the Northern Plains UAS Test Site for the creation of a Beyond Visual Line of Sight (BVLOS) network for drone operations offers infrastructure for integration of an RID network for demonstration and testing.

5.4 Reliability Assurance / Continuity of Service

All uAvionix equipment is built to high performance and quality standards. Products are designed and assembled in the USA, HALT and HASS tested, IPC-610 class II soldering, production functional testing.

uAvionix recently achieved its first Technical Standard Order (TSO) from the FAA. The TSO signifies that the FAA has examined, audited, and approved the quality and manufacturing processes for consistent high quality critical aviation avionics.

Optional functions requiring internet/LTE capability are subject to the reliability and availability of those service providers.

5.5 Spectrum

uAvionix ADS-B equipment currently operates within the protected aviation spectrum for ADS-B in both the 978MHz and 1090MHz frequency ranges. However, the underlying software defined radio at the core of uAvionix technology has some limited ability to frequency shift into other bands. (See also Section 6.1 regarding an option for an ADS-B only based solution.)

uAvionix recommends the following two options for frequency usage. Both options offer superior free space path performance and obstacle penetration.



5.5.1 Repurposing Distance Measuring Equipment (DME) Lower Bands

Distance Measuring Equipment (DME) are navigation aids used by manned aircraft. Recent discussions with FAA indicate that there may be an opportunity to repurpose a subset of the DME frequency bands for UAS surveillance. This has a precedent, as a similar repurposing was undertaken for 978MHz Universal Access Transceiver (UAT) ADS-B technology. The primary advantage for this recommendation is the selected frequencies can remain in the “aviation protected spectrum” range and remain under the purview of the FAA for enforcement of infringements. uAvionix can easily adopt current receivers to the 960MHz to 1090MHz range, with better performance at the low end.

5.5.2 TV White Space

White Spaces refer to frequencies allocated to a broadcasting service but are not used locally. This can be due to lack of TV or radio stations assigned specific frequencies in a region, or due to freed spectrum as a result of technical changes (such as the switch to digital television). A TV White Space database, or geolocation database – provides frequencies that are available for use in a specific geographic location. The advantage to this solution is that the geolocation database is a known entity within the industry and the frequencies are freely available without requiring a spectrum license. The disadvantage is that it adds complexity to the overall solution in that the RID device would “frequency hop” based upon its location, and a mechanism would be required to update the database whenever changes are made.

5.5.3 Other Less Desirable Options

The following are other frequency options that have stated limitations:

- 315MHz and 433MHz are legacy ISM bands used for garage door openers and keyless entry systems.
- 915MHz is an ISM band principally used for cordless landline phones.
- Any frequency above 1GHz will have multipath and fading issues due to the short wavelength, and requires line of sight (LOS).

It is expected that further discussion would be required with FAA and FCC regarding which frequency would be most desired.

In order preserve spectrum capacity and avoid system degradation at scale and high sUAS traffic volumes, uAvionix recommends very low power transmissions. The following are recommended power settings and their associated ranges of visibility within LOS.

Transmission Power	LOS Range
10mW	0.5 Miles
100mW	4 Miles
500 mW	10 Miles

For reference, a recent [study](#) published by MITRE indicated that 10mW ADS-B transmissions would support 14,000 sUAS under 500’ within a 30 mile diameter airspace without degradation.

Usage of LTE and internet communication networks were discussed in Section 5.2.

5.6 Limiting Factors

A limiting factor of the uAvionix or other solutions is in regards to the level of integration required with the host sUAS aircraft electrical and/or autopilot system.

All solutions offered will likely require a power source. The most reliable solution is to pull power from the sUAS system. In doing so, battery life and the resultant flight time for electrical sUAS is potentially reduced. The uAvionix RID device is estimated to require 90mA from the host sUAS, which is significantly less than is required from an LTE modem (typically 500mA), and will have negligible impact on flight time. Most professional grade sUAS are equipped with suitable auxiliary power source outlets, but there is a subset of all aircraft that do not have this capability, in which case a battery is required.

If the solution is instead paired with a portable battery – not only is reliability lowered, but increased weight on the aircraft would result in an overall size and weight degradation as compared to the integrated power source.

Many of the value-added features discussed within Section 6 require some level of integration with the sUAS autopilot. These features increase overall safety and security, but require the regulatory bodies to consider regulations on the autopilot interfaces.

The anti-spoofing digital signature is in itself a limiting factor. As minimal payload is desired for spectrum efficiency – the inclusion of the digital keys in each message itself increases the size of the RF payload to many times the size of the sUAS position and identification data itself. In turn, this results in reduced spectrum capacity. For full implications, spectrum utilization should be modeled analyzed.

5.7 Airborne Component

uAvionix is proposing to repurpose existing hardware, updated with new firmware for an RID device. The following components will be integrated into the existing uAvionix FYXNAV form-factor. FYXNAV is the world's smallest and lightest TSO certified GPS receiver and antenna. It weighs just 27 grams, has a 42mm diameter and an 18mm height.



Figure 8: The uAvionix RID will exist in a form factor similar to the existing FYXNAV GPS receiver.

The RID product in its base form will include the following:

- GPS Receiver and antenna
- 10mW (suggested) Transmit/Receive radio on TBD frequency. See Section 5.5.
- Persistent memory for configuration storage
- Integrated barometer for approximate height above launching point
- Wi-Fi for hotspot configuration.

The uAvionix base RID device is designed to be a “stick-on” device with no required electrical or data integration to the sUAS. However, aircraft and autopilot integration provides several additional benefits which are discussed in Section 6.

5.7.1 RID Chip

uAvionix also has the capability to provide the RID Tx/Rx chip to sUAS OEMs for direct integration into the aircraft to leverage the existing sUAS GPS, power, and autopilot connectivity. The RID chip is smaller than a dime and weighs only 1 gram.

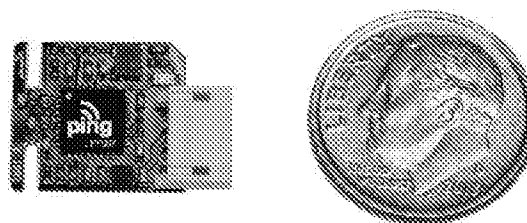


Figure 9: The uAvionix Ping RID Chip Can Be Integrated Directly into sUAS through OEM Integration for "Out of the Box" functionality.

5.8 Ground Component

Much like the airborne component, the ground component consists of existing uAvionix product hardware repurposed with updated firmware to meet the RID mission and frequency. Figure 10 illustrates the pingBuddy mobile receiver and PingStation permanent receiver.

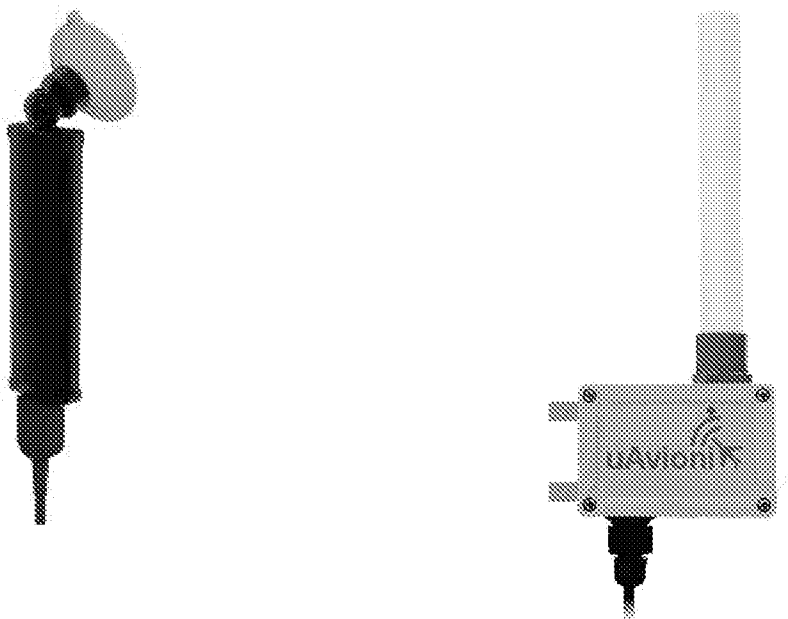


Figure 10: uAvionix portable "pingBuddy" receiver (Left) and networkable, fixed installation receiver "pingStation" (Right)

5.8.1 pingBuddy Mobile Receiver

The pingBuddy mobile receiver in its current form is a dual-frequency ADS-B receiver powered by micro-USB connector with integrated Wi-Fi for wireless connectivity to Electronic Flight Bag (EFB) applications. An updated firmware for the RID mission will frequency shift from the ADS-B frequencies to the target RID frequency. pingBuddy is small enough to fit in the pocket or glove compartment of every police cruiser. pingBuddy was recently featured by Flying Magazine's Gear Review as a Pilot Must Have item.

In single quantities, pingBuddy currently retails for \$149, which is already an affordable solution. With high quantities, pingBuddy could reach \$40-\$60 each.

5.8.2 pingStation Receiver

PingStation is a dual band (978MHz and 1090MHz), networkable ADS-B receiver with a Power-Over-Ethernet (POE) interface enclosed in an IP67 rated protective enclosure. PingStation provides ground surface or low-altitude surveillance within line of sight of the antenna, with range dependent upon the output power of the transmitting ADS-B transceiver. PingStation is robust enough to be permanently mounted outdoors in harsh environmental conditions, and small enough to be used as a mobile asset for roaming operations. Installation is simple with included pole-mount bracket, and a single POE cable which provides both power and data communications. Configuration is accomplished via a simple web interface. An integrated GPS provides precision timestamping for messaging.

PingStation networks can be deployed either as a wired LAN/WAN configuration, or as a wireless network leveraging LTE modem technology for easy installation and deployment.

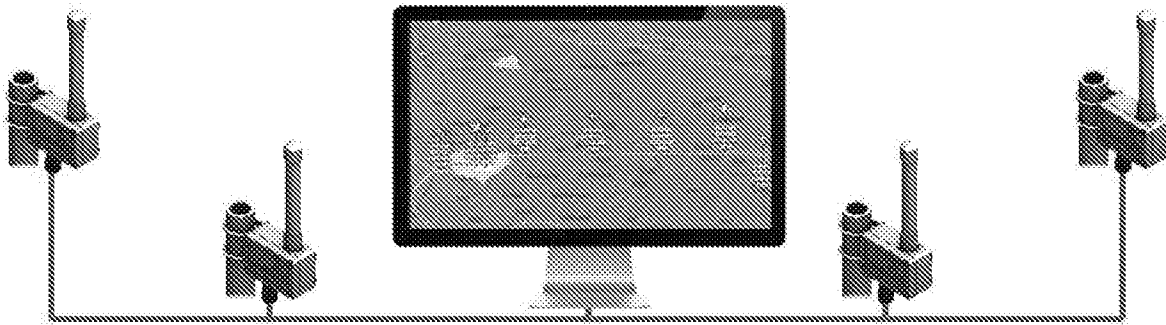


Figure 11: Multiple PingStations may be networked together to provide a wide area low-altitude RID and surveillance volume.

Rather than frequency shift the ADS-B receiver within PingStation to the target RID frequency, uAvionix will add an additional RID receiver to the existing PingStation enclosure. This then will provide low-altitude ADS-B surveillance as well as low-altitude RID coverage within LOS of any of the networked PingStation receivers.

PingStation has an open protocol that can be used to integrate the surveillance and RID data into any geospatial information system (GIS) display or airspace awareness display – both cloud based and locally managed. The cloud based solution would allow the RID display app to access a wide region of surveillance and RID data.

6 Value added Options

In addition to the base functionality described herein – uAvionix brings the capability to add value-added functionality that would benefit the operator, security personnel, and all airspace users.

6.1 Low Power ADS-B Only Solution

The use of low power ADS-B as the Remote ID protocol and frequency itself has significant merit. Rather than shifting to another frequency, remaining in the ADS-B spectrum (particularly 978MHz UAT) significantly increases safety benefits due to interoperability with manned aviation. Low power (0.01W-0.1W) provides electronic conspicuity from 1-5 miles to nearby aircraft while being compatible with the spectrum capacity at high traffic densities as outlined in a recent MITRE publication titled “ADS-B



Surveillance System Performance with Small UAS at Low Altitudes.” uAvionix recently published an article on this concept.

6.2 Two way communications – remote “land now” signal.

The uAvionix RID device is both a transmitter and receiver. This enables authorized security personnel to send a signal to the RID to command the autopilot to perform any number of functions. To enable this functionality, the FAA would need to consider mandating “hooks” into sUAS autopilot systems to respond to remote commands which would be unable to be overridden by the operator. Examples of simple remote commands are:

- Land Now
- Return to Home
- Hover/Orbit
- Proceed to GPS Waypoint
- Kill Switch

All of the above commands could be implemented with simple discrete IO, with the exception of the GPS waypoint, which would require the ability to transmit a “go to” location.

6.3 Low Power Inert and Alert ADS-B

Given the heritage in ADS-B, the uAvionix RID applications have the ability to “listen” for nearby manned aircraft transmitting ADS-B position information. If the nearby manned aircraft encroaches within a predefined radius (for example 3NM), the RID device can begin to transmit a low-power (10mW-500mW) ADS-B “beacon” signal that would alert the manned aircraft of the sUAS presence from 1-10 miles away.

6.4 sUAS to sUAS Mesh Network to Extend Range

In addition to broadcasting its own RID position and identification information, each RID device can act as a “repeater” for other RID devices which may be out of range of a ground receiver. Signals from each RID device would be intelligently rebroadcast by other airborne RID devices, extending the effective range of any ground based receiver by leveraging the airborne receivers as repeaters. This could even be deployed selectively and intentionally by security personnel who would purposely launch a repeater RID sUAS which would be used as a high-altitude receiver. See Figure 12.

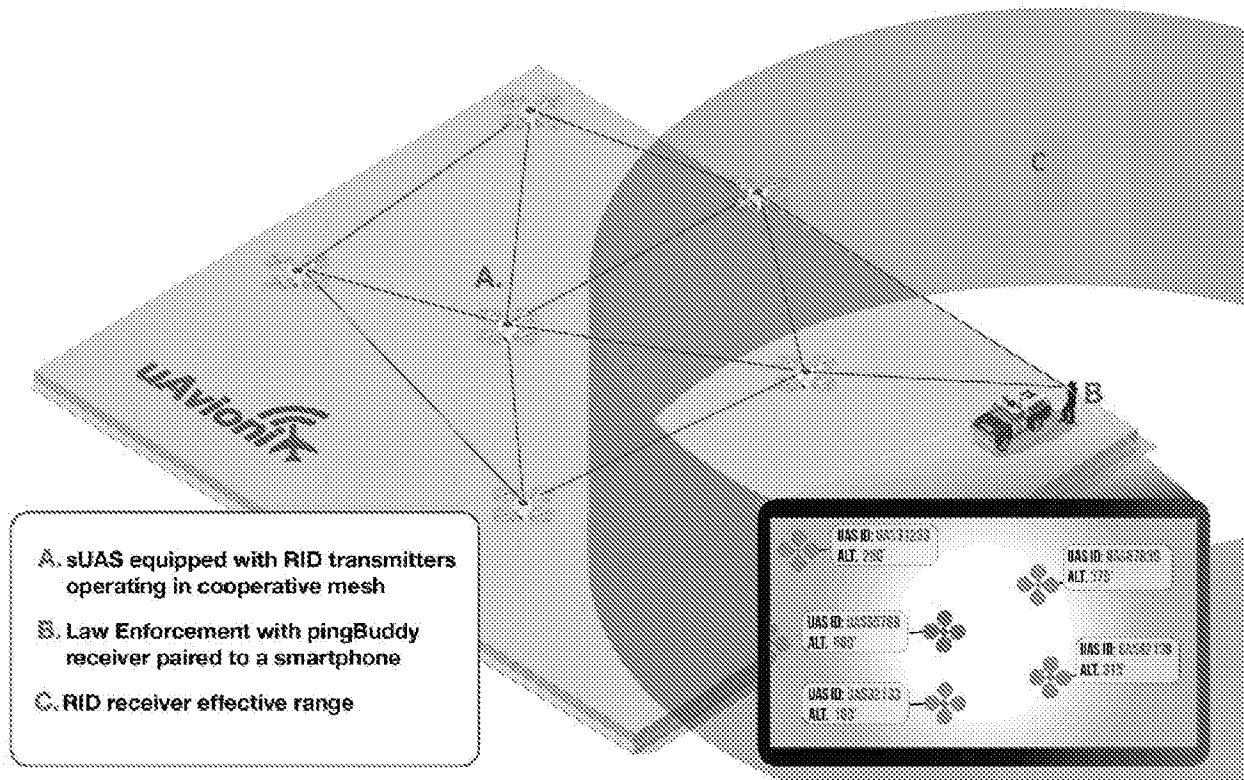


Figure 12: A Mesh Network of Intelligent RID Repeaters Extends the Effective Range of any One Receiver.

6.5 Black Box Data Recorder

Integrated onboard storage of the host aircraft sUAS, as well as data regarding nearby sUAS (leveraging the onboard receiver) can be implemented to aid in incident investigations. The advantage of leveraging the onboard receiver is that meaningful data can be retrieved regarding the sUAS involved in the incident even if the target sUAS is destroyed and data is not retrievable from its own systems.

7 Benefits of the uAvionix Concept

In summary, there are many benefits to the proposal concept that uAvionix is offering for a Remote ID Solution.

- The airborne solution meets the SWaP profile required for sUAS.
- The unit costs at scale support a regulatory mandate for RID equipment on board all registered sUAS, or sUAS operating under Part 107.
- The receiver solutions offer both low cost portability and low cost fixed installation options.
- The solution can operate with or without internet/LTE infrastructure.
- High TRL levels for basic components, allowing for near-term widespread deployment.
- Value added options which increase security, increase safety to other manned aircraft, and extend range without additional infrastructure



Finally, uAvionix suspects that many offered solutions will use LTE as a backbone technology for the offered solutions. Therefore, below are some comparison points for LTE solutions for consideration.

7.1 LTE Solution Comparison

As compared to a solution that requires an internet or LTE backbone to deliver the RID security services, the uAvionix proposal has the following advantages:

- Lower lifecycle cost. Both an onboard RID LTE device and security personnel operator device require a recurring subscription based data plan. The uAvionix solution requires neither, although additional services are available with an internet/LTE connection.
- LTE modems onboard the sUAS will require a higher power draw resulting in shorter flight times due to increased power consumption directly from the sUAS or through added weight of a larger battery.
- Both the sUAS and the receiver need to be within coverage of the LTE network for the system to function.
- Technological obsolescence and end of life (EOL). Non-dedicated infrastructure and networks such as LTE are dependent on carrier technology lifecycles, which risks relatively near term obsolescence when compared to traditional aviation infrastructure.
- LTE frequency bands vary widely by region, and present a difficult challenge when designing and certifying product. A single, internationally compatible solution provides greater coverage and higher security.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	REMOTE IDENTIFICATION			
First Named Inventor/Applicant Name:	Paul Beard			
Filer:	Chad Swantz/Stephanie Swanson			
Attorney Docket Number:	MINIX 17-1-1			
Filed as Small Entity				
Filing Fees for Provisional				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
PROVISIONAL APPLICATION FILING FEE	2005	1	130	130
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 (\$)				130

Electronic Acknowledgement Receipt

EFS ID:	28805711
Application Number:	62480031
International Application Number:	
Confirmation Number:	8174
Title of Invention:	REMOTE IDENTIFICATION
First Named Inventor/Applicant Name:	Paul Beard
Customer Number:	23531
Filer:	Chad Swantz/Stephanie Swanson
Filer Authorized By:	Chad Swantz
Attorney Docket Number:	MINIX 17-1-1
Receipt Date:	31-MAR-2017
Filing Date:	
Time Stamp:	17:44:33
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 130
RAM confirmation Number	040317INTEFSW17454800
Deposit Account	194882
Authorized User	Stephanie Swanson

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

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Provisional Cover Sheet (SB16)	1711_ProvisionalCoversheet_03-31-17.pdf	1477268	no	3
			2801ad360aa5168534676fab5490dbf369852abb		
Warnings:					
Information:					
2	Application Data Sheet	1711_DataSheet_03-31-17.pdf	1793260	no	8
			bfeb964de0b11a79547b466f5283816c1baa7127		
Warnings:					
Information:					
3	Specification	1711_ProvisionalApplicationFiled_03-31-17.pdf	1210297	no	16
			3ba60e29404b4e65ab92de04487854bb6291567c		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29649	no	2
			11f20e71ed472c62e72ef01cb25314f5a46b1824		
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